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Indian Problems

CONNECTED WITH

Education, Agriculture & Land Revenue,

BY

The Rev. A. ANDREW,

CHINGLEPUT.

Madras:
G. A. NATESAN & CO., ESPLANADE.

ERRATA.

1. For Rs. 105-6-3 in line 2 of page 64 *read* about Rs. 94.
2. The word Primary in the heading of appendices I and IV should be deleted.

Introduction.

A desire has been expressed by friends that the articles on Education and other topics which have appeared in the columns of the *Madras Mail* during the last two years should be put into a more permanent and convenient form. This I consented to do with the permission of the Editor. In publishing them in book-form I have taken the liberty of revising them and of abridging or expanding them where it was required so as to give them sequence and unity. The problems they deal with are of surpassing interest to all who desire to see the country rising in the scale of civilization and of culture, and go to the roots of the social and economic condition of the people.

The education of the masses urgently demands the thought of all ranks of the Indian community and of the Government and its administrative officers. For there can be no sadder sight than the many millions of boys and girls of school age, who are growing up without any education whatever in this great country, and the inadequate number of schools established for their instruction. Educated Hindus seem fond of talking about "National Schools," and other "National" things, but there does not appear to be any widespread desire among them to found schools to remove the gigantic defect in the intellectual development of the people, as pointed out, or any real patriotic spirit which will not rest till elementary education spreads over the length and breadth of the land.

Much of the spread of education must lie with the educated classes in the future and the sooner they realize it the better, and to help to bring it about they should consent to an educational cess in order that adequate funds may be forthcoming. They should found schools themselves in places where they are really needed, and bequeath money in their Wills for this purpose.

The part dealing with education is written with a view to give the facts about primary education without going into the numerous details connected with the curriculum, and the way the schools are conducted. It is more taken up with quantity than with quality. That the quality of the teaching is greatly in need of improvement all must admit; but when the growth of the population is greater than the growth of the primary schools in number one may be pardoned in insisting that attention should be concentrated on the increase of educational facilities first. The spread of education depends on many factors: on the Government policy and the ability to procure funds for it: on the attitude of the people towards it: on the action of Missionary bodies and of all who receive grants-in-aid: and on the kind of teachers employed. The last mentioned is of vast importance. Government should be increasingly liberal towards training institutions so as to train a sufficiently large number of teachers, and to train them with a view to fit them to teach children how to observe and how to be in touch with their surroundings. More and more effort should be put forth in inducing teachers to give an agricultural turn to their teaching in rural schools, and to develop nature-study among their pupils.

A Deputy Director of Primary Education, and a much larger staff of European Inspectors in the proportion of one to every two districts of the Presidency, might with advantage be appointed.

With regard to the problems connected with agriculture in India the chapter on it is a contribution towards their practical solution,not by an expert in any sense of the term, but by one who is striving to understand the practical needs of the rural population, and to point out the way in which improvement can be effected. I wish to draw special attention to an important fact. I have discovered that the two-and-a-half million acres of the paddy fields which are being irrigated by the thousands of irrigation tanks in South India can be rendered proof against the failure of the rains in any given year, *if a well be sunk in them for every three acres of the irrigated area.* Owing to the failure of the last north east monsoon rains the present season is the most favourable for the sinking of new wells or for the deepening of old wells. The sub-soil water has reached a low level, and this enables deep wells to tap the water at a much lower level than can be done in ordinary years—a level which will be likely to ensure a constant supply of water in future years, even when there may be a deficient rainfall. Ryots should take up this subject, and endeavour to sink wells in accordance with this ratio, and Government should come forward to see that it is carried out throughout the whole area, and assist liberally with advice and aid. Signs are appearing which show that a widespread interest is being awakened all over the country in agricultural concerns and in the application of modern appliances in raising water for irrigation. The initiative which Government has given in helping to develop well-irrigation and intensive cultivation at Melrosapuram, as an example of what can be done, is now being followed in not a few places in South India. The Melrosapuram farm is thus the pioneer of such undertakings in this Presidency.

The chapter on the Land Revenue Administration is the result of a study of the Land Revenue Problem which I undertook for my own information. It speaks for itself and makes it clear that the Government policy in connection with Revenue settlement is the only wise one, and should be so regarded by all unbiassed minds.

March, 1905, A. ANDREW.

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INDIAN PROBLEMS.

I. EDUCATIONAL PROBLEMS.

PRIMARY EDUCATION IN MADRAS.

I. NECESSITY FOR REVISION.

THE time has come when those interested in the well-being of the people of South India should bestir themselves to greater effort to bring elementary education within the reach of all who stand in need of it. The education of the people is one of the solemn duties of the State, and should be prosecuted with earnestness, statesmanlike skill and perseverance until the educational want of the people are completely met. Some may smile at this as a canon of perfection which cannot be realised in a country like India. But it may be urged in answer that unless a high ideal is placed before the mind, not much progress will be made in rising to a higher level of attainment.

No country can be in the foremost place in civilisation and culture that neglects the diffusion of elementary knowledge among the general population, and attends to the educational uplifting of the few. The foremost nations of the West have striven during the past forty years to make education commensurate with the total area of their respective countries, thereby reaching all classes of the people. Their aim has been to educate all children of school-going age, and to impart to them the power to read and write and such useful and practical knowledge as is suited to their station in life, and which could not be obtained by them by their own unaided efforts.

The application of this principle to India has been very partial, with the result that large numbers of the people of different castes have been left without any education whatever. The field for operation is vast. The opportunity to go in and take possession of the land is great and unrivalled. The British power, with its well regulated administration of justice, its protection of property, and its maintenance of order, in addition to all the other excellent functions it performs, has done much for the promotion of the welfare of the people. There never can be a better combination of favourable circumstances than there exists at present throughout the Indian Empire under the sway of the Viceroy. The British power is at its strongest; peace prevails on every hand; and the Indian Budget is beginning to be prosperous with enlarged capabilities. The most potent influences of the Home civilisation are being exercised with much effect throughout the country.

Thus in many ways India is making progress. But in some ways, however, the progress has been small.

With all the civilising agencies at work we find that the development of education, more especially in the elementary branches, has been very inconsiderable. This remark applies to the whole of India where there are about forty millions of boys and girls of school-going age who are left in dense ignorance and intellectual stagnation. This vast number of neglected children should surely appeal to our imagination and to our sympathy! Surely it is the paramount duty of the State to make more strenuous endeavours than ever it has done heretofore to reach this vast mentally undeveloped army of little ones! Surely it ought to be the concern of the State to look about for the ways and means in order to put the educational machinery into motion on a comprehensive, country-embracing scale! The mind rules the man. If there be the will-power, the opportunity to exercise it is generally at hand. If the Government is determined to exercise its prerogative, and to demand that the education of the masses be taken up on an extensive scale, it will, I believe, be able to find the ways and means, as has been done in other countries.

The need for extension has been felt since 1822 when Sir Thomas Munro sent his minute on the subject to the Court of Directors. Various attempts have been made since then. The famous Despatch of 1854 marks an important era in the history of education in this Presidency. Its object was "to promote a higher degree of intellectual fitness," and "to raise the moral character of those who partake of its advantages." One of its chief aims was to spread elementary knowledge among the people. It defined the principles to be adopted in extending education, and established on a firm basis the system of grants-in-aid to aided schools.

The Education Commission in 1882 urged the adoption of the principles laid down in the Despatch, and recommended "that Primary Education be regarded as the instruction of the masses in the vernacular in such subjects as will best fit them for their position in life, and be not necessarily regarded as a portion of instruction leading up to the University." "That while every branch of education can justly claim the fostering care of the State, it is desirable, in the present circumstances of the country, to declare the elementary education of the masses, its provision, extension, and improvement, to be that part of the educational system to which the strenuous efforts of the State should be now directed on a still larger measure than heretofore...... that an attempt be made to secure the fullest provision for an extension of primary education by legislation suited to the circumstances of each Province."

The recommendation, thus so forcibly and clearly enunciated, is excellent, and would have met the needs of the country had it been put into force on an adequate scale. But we have to confess that no adequate extension has ever been brought about in the Madras Presidency—that sufficient funds to put it into force have never been available for some undiscoverable reason.

II. THE EXTENSION OF PRIMARY EDUCATION.

THE Hon'ble Dr. Bourne, Director of Public Instruction, said the other day in the Madras Legislative Council that *the* subject of the day in the Madras Presidency is the extension of Primary Education. This is true. The education of the masses is one of the great problems before the minds of Indian statesmen and administrators, and of all who are co-operating. The Government of India, in their recent Resolution on the Indian Education policy, clearly admit the necessity for the extension of education, and the fact that the initial force of expansion has received a check in recent years, and is on the decline from various causes. They unhesitatingly declare that Primary Education has not received the attention it deserves, and that in consequence it has not got a proper share of the public funds. They are of opinion that it should be made a leading charge upon Provincial revenues, and have a predominant claim upon the expenditure of Municipal and District Boards. The Madras Government, in reviewing the late Director's Report, stated that Primary Education has still much lee-way to make up in the Presidency, and made the remark that "in the Lower Primary stage there were actually 21,561 fewer male pupils under instruction in public institutions in 1902-03 than there were ten years before—a falling off equal to 4 per cent. in spite of the growth of the population," and that throughout the Presidency the advancement of Primary Education "must be the first object kept in view by the Educational Department." They believe that payments of grants-in-aid in full, and the carrying out of certain reforms they have in view, will bring about a period of progress.

This is a sanguine view, but it may be questioned whether any real progress can be made without the inauguration of the policy of expansion so forcibly laid down by the Educational Conference which met in Madras in July last year, which was to the effect that a policy of expansion on a scale commensurate with the needs of the country be inaugurated, and that funds of a gradually increasing amount be set apart for this purpose. Giving full grants to existing schools is excellent, but if this, and the carrying out of the reforms in view, be all that the Government are going to do, the expansion, so much desired, will scarcely ever become an accomplished fact. What the Government propose to do does not go far enough to meet the clamant needs of the vast population of South India.

What are the facts? Are the schools keeping pace with the increase of the population? The Director's Report reveals the startling fact that under the head of public institutions no fewer than 469 primary schools were closed in 1902-03. There was an increase in the number of public and private institutions, leaving an actual reduction of 157 schools of all grades. At the end of the quinquennium 1901-02 the number of public institutions was 913 fewer than at the beginning, and if the 455 fewer in 1902-03 be added, there is a reduction of 1,368 institutions in six years! Last year, therefore, seems to have been specially significant in the backward course, as about half the number of public institutions disappeared in it as had disappeared in the previous five years. No doubt there was an increase in the strength, but the increase was hardly of much consequence, since only about four pupils, on an average were added to each surviving school, and this in six years! It is to be hoped that the Educational authorities will not rest till they discover and grapple with the causes which operate with such disastrous effect among the public institutions. These may be either that the conditions of recognition are such as cannot be easily complied with, or that there is a disinclination on the part of many teachers to qualify themselves and submit to departmental rules and supervision, or that the teachers are so inefficient that the Department does not consider their schools worth looking after.

In India, as in all other countries, a distinction has to be made between urban and rural areas. This distinction ought to get full consideration when educational matters are being considered. That it has not received proper consideration may be seen by a study of the question. It is found that there is a vast disproportion in the number of schools in urban and in rural areas. That urban centres should have a larger proportion of schools than rural tracts is to be expected, but when one has the lion's share and the other an insignificant share, it is not assuring and hopeful for the intellectual uplifting of the great mass of the people. In this Presidency there are 54,839 towns and villages. Of these, 234 are towns containing a population of over four millions. The remaining villages and hamlets have a population of thirty-four millions. To educate the children of school age there are 26,334 public and private institutions of all grades. If evenly distributed, there would be forty-eight towns and villages supplied each with a school, and fifty-two that would have no school whatever. From the Director's Report, Vol, II. we learn that there are 27,644 villages or groups of hamlets in close proximity to each other having a population of 200 or more, and 18,752 villages or groups of hamlets having a population less than 200. To meet the educational wants of the rising generation there are 14,127 villages of the former class and 961 of the latter which have one or more schools. There are thus 31,308 villages and groups of hamlets without any means of education. This reveals the startling fact that more than sixty-seven villages in every hundred, or about two-thirds of the rural area, have no school of any kind.

Some Districts are very badly off in the matter of schools. In villages with a population of less than 200 scarcely anything is being done. Godavery, Salem and South Canara have in this class of villages only two schools in every hundred villages; Coimbatore has three in a hundred; South Arcot, Nellore and Vizagapatam have four in a hundred; Ganjam has five; Kurnool eight; Madura, North Arcot, and Bellary have ten; Chingleput has eleven; while Anantapur and Kistna have thirty and thirty-six, respectively. The percentage in the larger villages ranges from thirty-three in Salem to seventy-five in Tinnevelly. Altogether, there are on an average fifty-one villages in the hundred among the larger villages and five in the hundred among the smaller villages that are supplied with one or more schools. The sad thing about this is that during last year there was a reduction of 458 in the larger villages and 168 in the smaller villages having schools in them. Earnest efforts, surely, should be made to give back the lost schools and restore what the village folk have lost by the disappearance of these elementary institutions.

It is far otherwise in the large centres of population. In the sixty-one Municipalities, containing two-and-a half millions of inhabitants, there are 2,917 schools, or about one-ninth of the total number of schools. In these institutions 208,000 boys and girls are reading, or about one-fourth of the total scholars. Each Municipality has on an average forty-seven schools with 3,410 pupils. In order to educate the five million school-going children of non-Municipal areas there are only 23,417 schools of all grades.*

With regard to the stability of the village schools it may be said that they possess a rather precarious existence. There seems to be a constant flux among them. If the table on page 87 of the second volume of the Director's Report and the Return 4 be studied, it will be seen how great has been the fluctuation during last year. The tables reveal the fact that in 883 villages and groups of hamlets primary schools had been withdrawn, and in 257 other villages and groups of hamlets schools had been opened, leaving 626 villages without schools. There were 699 public primary boys' schools closed and 243 new public primary boys' schools opened. Some of the Districts fared badly. Bellary lost primary boys' schools in 136 villages and groups of hamlets; North Arcot lost 206; Madura, 179; Trichinopoly eighty-six; and Godavery sixty-one. Cuddapah was fortunate in getting schools planted in sixty-nine villages, and so was South Arcot in getting them planted in sixty-six villages. Other Districts were less fortunate.* But what shall we say of the 31,000 villages and groups of hamlets scattered over the length and breadth of the land which are destitute of any educational institution whatever? In Municipal areas 42·9 per cent. of children of school-age are not at school, as against 87·4 per cent. in non-Municipal areas.

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* See Appendix 1.

Altogether, there are about 4,800,000 children of both sexes growing up in ignorance, and the number is increasing faster than the schools can take them in. Why should those who desire the good of the people rest content with this appalling fact? Why should they not be stirred with the thought that in a single year 626 villages have been deprived of their simple educational institutions? Is the day never to dawn which will scatter with its gladsome beams the prevailing rural darkness?

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* See Appendix II.

III. THE SPREAD OF EDUCATION AND THE GROWTH OF THE POPULATION.

NO one who desires the good of India will be satisfied unless he sees the country developing in every direction. The benefits derived from education and culture should be sought for and appropriated by the people of this land. Western civilisation has advanced in Europe and other Western lands during the past half century through the general diffusion of knowledge and the spread of education among all classes, from the highest to the lowest, with the result that trade and commerce and every branch of industry have been carried on with great energy, and developed to a marvellous degree. This could never have taken place had education not been made general and compulsory. India, therefore, will never rise to greatness in modern times unless she craves for education and culture, and rests not till she gets it. Educated Indians whose eyes have been opened to realise the beauties and broadening influences of the vast field of literature should bestir themselves on behalf of the myriads of their fellow countrymen who know absolutely nothing of such. The educational system at work is not keeping pace with the growth of the population, and is unable to meet the educational wants of all.

If the increase in the population was the same last year as it was in the decade ending with 1901, there were 17,652 children added to the list of children of school-age not at school in this Presidency. That is to say, the schools were not able to take in the children of school age that became eligible for education through the addition of the children, that were born during the year, to the list on the 15 per cent. ratio. The Brahmins were able to reduce the list of their uneducated children by 2,875 by getting a larger number of their children to attend school. The Native Christians reduced theirs by 990, and the Eurasians and Europeans by 82. But, on the other hand, the Mahomedans went back by 3,132 and the great non-Brahmin community, including the Panchamas and others, went back by 18,467.* It is sad to think how the shadow is going back on the educational dial in respect of these two great communities. There can be no question as to what their future will be in intellectual, social and material concerns if this downward course be not arrested promptly. But Madras is not singular in this respect.

Comparative statements are often useful, as they give what is termed the true perspective. In order to ascertain what has been done in India on a large scale to bring the children of school age under instruction the seven largest and most populous Provinces of the Indian Empire have been chosen. The figures are got from that most useful book published by the Government of India entitled "Judicial and Administrative Statistics of British India for 1901-02." Burma stands first in education of boys in all grades of schools in 1901-02 with a percentage of 39·4 of boys of school age on the rolls of the schools. Bombay stands next with a percentage of 37·9; then follow Bengal with 27·8; Madras with 25·8; the Central Provinces with 18; the Punjab with 12·2; and the United Provinces of Agra and Oudh with 11·7. Bombay stands first with regard to the education of girls. In the same year there were 6·9 per cent. of girls of school age in that Province. Burma comes next with a percentage of 6; Madras with 4·5; Bengal with 1·9; Punjab with 1·7; the Central Provinces with 1·5, and the United Provinces with only 0·6.* Madras thus is not the Province in which education has made the greatest strides in India, as has been frequently asserted. Madras stands only fourth in the list in 1901-02 for the education of boys, and third for girls.

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* See Appendix III.

With regard to literacy, Burma heads the list easily for both sexes. In that Province 378 males and forty-five females in the thousand can read and write. Though Burma possesses only about a fourth of the population of Madras it has nearly the same number of literates, *viz.*,

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* See Appendix IV.

2,223,962. The explanation for this comparatively satisfactory position is that there is no caste system, as in Madras, to act as a brake on the educational wheel, and that there is a remarkable system of indigenous free education conducted by the Buddhist monks. In almost every village where there is a monastic institution the presiding *pongyi*, or priest, gives free instruction to all children who care to attend. Madras stands second in literacy, having 119 males and nine females in the thousand who can read and write.* Bombay is nearly equal with 116 and nine, respectively. Then comes Bengal with 104 and five; the Punjab with sixty-four and three; the United Provinces with fifty-seven and two; and lastly the Central Provinces with only fifty-four and two.

Turning to the question whether the spread of education is keeping pace with the growth of the population, we find that three of these Provinces are managing to outstrip the growth of the school-going children, and four are falling behind. The latter lost ground to the extent of about a million, while the former gained ground to the extent of 230,000. Bengal added 377,487 children to the list of unfortunate children not at school from 1892-93 to 1901--02, that is during ten years. Burma added 141,026 to the same list; the Punjab added 230,269; and Madras,

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* See Appendix V for the number of literates and illiterates in each of the districts of the Madras Presidency.

I am sorry to say, added no fewer than 259, 773. Bombay on the other hand, managed not only to take up all the children caused by the increase of the population, but also to reduce the list of the children not at school by 41,299; the Central Provinces reduced it by 143,481; and the United Provinces of Agra and Oudh by 45,053.* Thus Burma, Bengal, the Punjab and Madras were falling behind during the decade to the extent of 100,000 a year! This surely is a most startling fact! It should induce every one to be up and doing so as to stop this unpleasant swelling of the list of neglected children of both sexes which is operating on such an extensive scale.

IV. SUGGESTIONS TOWARDS IMPROVEMENT IN PRIMARY EDUCATION.

OF late the Viceroy has appointed several important Commissions, but it seems to me that the most important subject was left out. There ought to have been a Commission appointed to enquire into the education of the masses, and to suggest means for the spread of primary education and how its extension can be co-ordinated with the other work of the administration of the country, and how funds can be secured for it. It must surely be the anxious desire of the different Governments to provide with the same care and foresight the means for the intellectual development of the masses as it is to provide for the keeping of the people alive by means of the extension of irrigation works and of the establishment of the Medical and Sanitary Departments. Vast sums of money are spent on these, and not nearly so much on the spread of education. A special Commission might help to turn the scale in the right direction.

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* See Appendix IV.

Further, there might be an improvement made in the higher inspecting agency. This was recommended by the Educational Conference of last July. In forwarding Resolutions of the Conference to Government the late Mr. G. H. Stuart remarked that there was a widespread belief that primary education was better cared for in the time when there were eight European Inspectors than it is at present when there are only two. He was of opinion that the Districts are far too large, which stood in the way of the Inspectors visiting the primary schools, and that the creation of a subordinate class of Assistant Inspectors did not make up for the reduction in the number of Inspectors. I firmly believe that there is a crying need for more European Inspectors, and that Mr. Stuart's opinion is correct. For the inspection of primary schools is wholly, or almost wholly, in the hands of the subordinate staff.

There are only four Inspectors, two of them being Europeans. The obvious question may be asked:—How can four men look after, in co-operation with their subordinates, the 19,193 secondary and primary schools for boys, and the 4,707 private elementary vernacular boys' schools? It is impossible. If aggressive work is to be undertaken, a larger European staff is essential. Men are wanted who will look at the rural needs with their own eyes, and form their own judgment by personal observation as to what is required to accelerate the spread of elementary instruction.

Mr. Gait, in the Report on the last Census mentions the hindrances to education and the sentiment which prevails against allowing children of low origin to sit with those of the higher castes at school. "Its indirect effects," he says, "are even more far-reaching, owing to the fact that the officers of the Educational Department, with whom the decision practically rests as to the localities where new schools are to be opened, and what grants-in-aid should be given, belong almost exclusively to the small privileged group of high castes. In Bengal, for example, excluding forty-four Europeans and Eurasians, who are employed mainly in the administrative appointments, or in institutions where higher education is imparted, there are 137 officers of the Education Department, of whom no less than 111 are Brahmins, Saidyas and Kayasths, only nine are Mahomedans, five are Native Christians, and twelve belong to other castes. The lower grades of the community are entirely unrepresented."

This needs no comment. The personnel of the Madras Education Department is very similar. The great majority of the staff are Brahmins on whom the development or retardation of instruction so much depends. Pride of rank or of caste is apt too often to warp the judgment of even the best of men in this country and cause them to shut their eyes to the needs of these lower in the social scale. This sentiment, if allowed to be operative, must disqualify a subordinate officer for his vocation and stand in the way of progress. Let there be a much larger staff of the higher officers, and let some of them be set apart for the sole purpose of going about the country and devising means to expand primary education, and great and rapid will be the results achieved.

To say that the people are poor and apathetic in the matter of education is poor comfort. There is no reason to doubt this. If efforts were put forth by special men, a really substantial advance could be made. Those who are pushing industry and commerce in Western lands do not wait till people come to them to buy their goods. They themselves become aggressive and send forth their travellers and representatives in order to win over customers that they may be led to take what they have got to sell. Their one aim is to develop their business, and they are willing to spend money to gain their ends. Why should there not be more of the aggressive spirit shown in the fostering and extension of primary education? Why should there not be special men set apart for this purpose —men who should go about endeavouring to persuade people to send their children to school, and selecting suitable localities for the opening of new schools? We want men like Mr. A. Chatterton, who has been specially set apart for the fostering of technical education; men of enthusiasm and initiative who will earnestly strive to promote this great and important cause.

The Educational Conference last July was of opinion that the educational power at present exercised by Municipal and District Boards should be transferred to the Educational Department, and that the Boards should make contributions from their funds for the support of the schools which would be transferred under this arrangement. The view held by the Conference was that education was not worked with advantage by these Boards, and that it would far better if the present dual control were abolished. There is much to be said for this view. Education is going back under the Board's administration. In 1896-97 there were 3,261 Local and Municipal Board Schools with 154,393 pupils; while in 1902-03 there were 2,681 schools and 144,375 pupils.

Thus in seven years there was a fall of 580 schools and 10,018 pupils. These Boards are specially defective in female education. There are only five Upper Primary and two Lower Primary Schools for girls in connection with the sixty-one Municipalities. The Local Boards have only three Upper and one Lower Primary Schools for girls. As for secondary schools for girls there are only two in all. This is a shamefully meagre list. The spread of female education seems to be of no concern to the Boards. The whole situation shows that the Boards do not take much interest in education. I fear that the Board members never look at any of the schools in their charge, and I am afraid that the Chairmen of Municipalities and the Presidents of Local Boards have not the time to attend to the management of the schools of which they are the official managers. It is not possible for the President of a Taluk Board, for example, to attend to the schools in his charge. His duties are multifarious. He has to look after the state of the crops and of the people. He has to keep his eye on the land records, and grant remissions of revenue when necessary. He has to look after the tanks and minor irrigation works and keep them in repair. He is chiefly responsible for the proper administration of criminal law by the subordinate magisterial officers, and for law and order in his division. Hs has further to collect the land revenue, and also the forest, income-tax, and abkari revenue. He has to do with the working of the Police, and has to fix the number of toddy shops, settle land disputes, and act as a First Class Magistrate himself. He has to perform most of the duties of the Collector in his own part of the district. I have a great admiration for the members of the Indian Civil Service, and for the great work they are doing in maintaining a high standard of administration. They are very hard worked officers, and it is because of this that they are not in a position to give sufficient time to the work of inspecting and supervising schools in their divisions.

If the transference which the Conference recommended does not take place then a representative School Board may be created in each district, composed of some of the leading men of the district, and also of the principal educational officers. The School Board, thus constituted, might exercise the power the Boards have and push on education much more rapidly and effectively, if properly managed. It has been the School Boards that have developed education to such a large extent in Scotland. A new Education Bill for Scotland is before Parliament, one of the chief objects of which is to create four general councils of education whose business will be to administer the educational work for the four great divisions of the country, and to see that there is proper co-ordination of all the branches of education throughout the different counties. The time has come for some change to be made in Southern India, which will cause primary education to spread as it ought, and it may be that School Boards, and general educational councils, if constituted, would be a powerful means in bringing this about.

The old communal idea, so prevalent in India in ancient times, might be utilised more than it is. The village was the unit and it was administered by village officers. A good deal of this administration is still in force. The Government has 24,105 ryotwari and inam villages in each of which village officers are at work. In addition to these there ought to be the village schoolmaster. There are 54,809 villages in the Presidency, each with a population under 5,000. If a school was established in each of these the present number of schools would at once be doubled. But even this addition would be greatly under the mark. Last year the average number of boys and girls in the schools was thirty-one for each school. To undertake the education of all children of school-age about 160,000 additional schools would be required. To provide for these schools an education cess might be levied of one anna in the rupee of the land revenue assessment. The average land revenue for the three years ending with 1901-02 was Rs. 580 lakhs, and hence an anna cess would yield Rs. 36 lakhs. This would make a good beginning and provide for 69,000 additional schools.

Wealthy Indian gentlemen might show their patriotism by endowing educational institutions. Legacies might be left in order to do this as was done in connection with Pachaiyappa's College and Schools. If the educated and wealthy Indians were alert for their country's good, and loved to see it rise in intellectual and material greatness, they would be the more ready to give some of their wealth for education. Think of Japan, and the astonishing feats in the application of modern methods of military science, and in intrepid daring and skilful strategy, that she is showing to the world. What has brought her to this splendid position ? It is her openness to receive new ideas; her great thirst for education; and her determination to educate all ranks and classes of her people in her remarkable island empire. She has close on five millions of children in her elementary schools, as against about 730 thousand in Madras. What an object lesson this is ! Let educated men have a pride in getting the children educated. Let them co-operate in introducing the new era of compulsory education. This era may at once be partly begun in Municipalities and Unions, as is the case already with regard to vaccination. But they must press for it in earnest. May all classes be awakened to a sense of their real needs and responsibilities, and be led to be prepared to take advantage of the opportunities which are presenting themselves from time to time to advance the education of the masses.

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V. Rural Schools.

THE Government of India have taken an important step in laying down the principle that the instruction of the masses requires some differentiation in the courses of study in rural schools. The aim of rural schools should be to train the children to be observant, and to make experiments, on however humble a scale, so as to give them some intelligent idea of the agricultural operations carried on at their very doors, and also to put them in a position to protect themselves in their business transactions with the landlords and village dealers. The Government of the Central Provinces commenced this system of rural education in 1899. Mr. Sharp, in his *Occasional Report* on this system gives full and interesting details about the half time rural schools. In connection with the village school there is the Village School Committee, composed of the headman and some of the more important villagers. The curriculum is framed on the half time system, providing elementary instruction suitable for the children of ryots in the morning, and permitting them to work in the fields or in the school garden during the rest of the day. Pupils have the option of being full time pupils if they so desire it. To most rural and vernacular schools a garden is attached. If a suitable piece of land for a garden is not procurable, a garden patch in the vicinity of the school is made use of, and where even a small piece of land is not available flowers and vegetables are grown in pots in the school verandah. The school garden supplies the classes with the object lessons for illustrating the various elementary lessons given in agriculture and in the rearing of plants and vegetables, contained in their class books. If success can be achieved in rural schools in the Central Provinces, why can it not be achieved in this Presidency ?

In Western lands much has been done in this direction. In a pamphlet published by Isbister and Co., some years ago, giving sketches of Agricultural Teaching in foreign countries, we are informed that out of 4,400 schools in Norway and Sweden in 1873, there were 2,166 schools which had gardens attached to them for the purpose of giving elementary instruction in agriculture. In Austro-Hungary, in the same year, 2,000 Primary Schools had agricultural courses, 3,000 had courses in arboriculture, 1,500 in bee farming, and 700 in silk worm culture. In Denmark the half time rural school has for many years been in vogue, and at harvest the schools are closed altogether so that the children may help in harvesting operations. In France, in 1874, agricultural study was followed in seventy-six Normal Schools, and in 8,000 Primary Schools, while there were school gardens attached to 27,900 Primary Schools. In seventy-four Departments the teachers were obliged to give an agricultural direction to their teaching.

"The great *Enquete Agricole* of 1866 revealed the sentiments of the rural population, who expressed their strong wish for the introduction of Agricultural teaching into Primary Schools. One of the questions asked was this: 'Is primary instruction conducted in a way favourable to agriculture, and what is its influence upon the choice of professions?'

Mr. Pinel then Inspector of Primary Teaching, had the happy idea of collecting from this enormous volume of testimony a very interesting volume entitled '*Ensiegnement primaire en presence de l' enquete Agricole.*' It is necessary to look through this collection of authentic extracts to see with what unanimity and clearness the cultivators, proprietors, and Councillors General agreed to demand the reform of primary teaching, for the sake of adding practical and ordinary agricultural teaching as the only means of attaching the child to the school, and the young man to the country."

In Italy the Italians have made some progress in recent times in this direction. Senor Bacelli, when he was Minister of Instruction, felt the great need there was for teaching the ignorant peasants to appreciate the value of the teachings of modern science. Mr. Tremayne, in the *Fortnightly Review* for June last year, refers to this. Senor Bacelli said " Let us go back to the fields. Let us wake in the new generation the love of the fields. From the little field in which the country schoolmaster will teach experimentally the first notions of agriculture, up through the technical and professional schools, everywhere will be awakened the Virgilian love for field works." With these sentiments Senor Bacelli launched the scheme for the establishment of what is called the *campicello*, or little field, and which is attached to the Primary School. This system, if carried out, will undoubtedly improve the condition of the Italian peasant. It certainly will tend to open up the child's mind, and stimulate it to think for itself on what it sees around.

Primary education in rural areas in this Presidency has been modelled on the curriculum suited for urban schools. There has been no differentiation at all introduced. A radical reform is, therefore, needed in this matter. The tendency of the instruction given in rural schools in the past has been to divorce the mind of the country child from its environment, and to inspire it with ambitions and ideals which are difficult to attain. The disaffection towards rural things, which is too frequently the result of the present system of primary education, and the strong desire there is for young people to migrate to the cities and towns with a view to rise and become clerks or get into some Government post, would be to a large extent mitigated by the establishment of rural schools such as has been described. Such schools would be more suited to the large agricultural population, forming nearly three-fourths of the whole population.

Let the Director and the Madras Government initiate such a system as is being successfully worked out in the Central Provinces, and great good will be the result. I have no doubt but such a system of rural schools, if established in this Presidency, would give a great impetus to primary education. The Director sees the need for the spread of primary education, and holds that at least Rs. 100 lakhs are needed to bring it about. Why should the people not say that this sum must be put into his hands in addition to what is being already spent on them? If the people demand it earnestly, and are prepared to make some sacrifice to attain the end in view, there is no real difficulty in the way.

CHAPTER II.

AGRICULTURAL PROBLEMS.

I. AGRICULTURAL EDUCATION AND MODERN MOTOR APPLIANCES.

ATTENTION ought to be largely drawn to an important article by Professor A. Chatterton on "Agricultural Education" in the August number of *The Indian Review*, 1903. It must be admitted that improvement in this direction is necessary in a country like India. Indeed, there is scarcely any agricultural education anywhere which is fitted to meet the wants of the rural population. The question of improving agriculture and of teaching the people how to bring it about in a practical fashion stands first and foremost. This is because the great mass of the population is dependent on agriculture for a livelihood. Out of a population of 38½ millions in the Presidency of Madras, 26½ millions, or 69 per cent. are supported by agriculture. The Agency Tracts in the North have as many as 81 per cent. dependent on agriculture, the four Deccan Districts have 71 per cent., while five out of the ten Southern Districts range from 73½ to 80½ per cent. Further, more than a third of the total revenue of

Rs. 1,505 lakhs received by Government in 1901-02 was got from Land Revenue. To the people who depend mainly on agriculture for support, and to the State that derives such a substantial sum from the soil, the question of improving agriculture and consequently of bringing more out of the soil is one of supreme importance. All other occupations in India, where the mechanical appliances and varied handicrafts of Western lands have not been introduced to any appreciable extent, must sink into insignificance, however important and lucrative they may be to certain classes, in comparison with agriculture.

Modern education has been too literary for the mass of the rural population. Village schools have been modelled on schools best suited for cities and large centres, with the result that the minds of thousands of the people dwelling in the country districts have been directed away from the importance of agriculture, and the benefits which may be derived from it. The owners of land who are educated—the Zemindars, Shotriamdars, and big proprietors—too often flock to the cities and leave their estates to be managed by paid agents, and live in luxury and idleness, and in ignorance of the great gain they might get by devoting their attention to introducing the most approved methods of agriculture. Absentee landlordism is to be deplored, more especially in India, where so much remains yet to be done.

Kambar, the Tamil poet, has written beautifully in praise of agriculture. He has said :—"Even students of the Vedas and in other branches of knowledge must wait at the door of the husbandman. The prosperity of the subjects of powerful kings depends on the ploughshare. So, who can describe the importance of the agriculturist?" Tiruvalluvar in the Kural has also said :—

"Howe'er they roam, the world must follow still the plougher's team;

Though toilsome, culture of the ground as noblest toil esteem."

While admitting that the ryots of India have acquired an excellent working knowledge of cultivation, which has been gained through centuries of experience, and that garden cultivation, as practised in Coimbatore and other places, has been very successfully conducted, it must, however, be said that much remains to be done in the way of improvement. Dr. Voelcker, in his Report on the improvement of Indian agriculture, has spoken in admiration of garden cultivation and remarked that it could scarcely be improved upon. This was ten years ago. But he evidently did not take into consideration what could be done with the aid of oil-engines and pumps in raising water from wells, river banks, and collections of water for irrigation purposes, instead of by bullock or human power. The efficiency of the oil-engine and pump for raising water is greater by far than that of any Indian contrivance whatever, and is greatly cheaper in the long run.

What is wanted is an inexhaustible supply of good subsoil water, and a sufficiently powerful pump, with, of course, in addition, a plentiful supply of cooly labour and of manure; and the result will be very gratifying to all concerned. The outturn will be very much greater and more valuable than what can be raised by means of the ordinary methods of cultivation.*

The employment of engines and pumps would not be a substitute for the tank and channel systems of irrigation. The great irrigation works, with their thousands of miles of main and distributory channels, which have been initiated and promoted by the Government of India, have been the means of untold blessing to the country, and are the admiration of the civilised world. The tank system of irrigation in South India has been developed about as far as it can go, and almost every available watershed harnessed to do its duty in storing the rainfall. Many of the tanks, now improved and kept in order by the Government, were the work of Hindus long before the advent of the British power, and show considerable engineering skill.

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* In Egypt 4,000 steam pumps are at work in raising water to irrigate about 500,000 acres. Why should India be lagging behind Egypt?

But these works are intended for, or are practically given up to, the irrigation of rice fields.

Rice requires a large quantity of water to bring it to maturity. Even rice does not yield a high return per acre.

The average value of crops per acre in the ryotwari villages of the Presidency, excluding Malabar and South Canara is only Rs. 30 for rice; Rs. 10¼ for ragi; Rs. 10 for cholum; and Rs. 9 for cumbu. The average for all food-grains is only Rs. 15 per acre; for oil seeds it is Rs. 22. The average for garden produce is very much higher and more profitable. Chillies bring in on an average Rs. 100; turmeric, Rs. 250; sugarcane, Rs. 200; and tobacco, Rs. 100. It is evident therefore that it will not pay to use an engine and pump to raise water for the cultivation of food-grains, but it is quite different with regard to the cultivation of the more valuable crops. With them there is a very much greater of margin left for meeting the larger expenditure of running a pump. According to the table given on page 241 of the *Land Revenue Policy of the Indian Government*, about 14 per cent. of the total value of the crops raised is got from the raising of chillies, turmeric and other condiments and spices, sugarcane and other sugars, tobacco, and orchard and other garden produce; while about 66 per cent. is got from the raising of food-grains.

So long as the tanks and irrigation-channels exist in South India, rice and the other food-grains will continue to be raised by surface-flow irrigation, which is very easy and suits people who dislike much trouble or exertion. The more valuable crops, however, are generally raised by means of well-irrigation, and this is a most laborious process. According to the same table there are 826,000 acres of valuable crops under cultivation in Madras. This area could be more than trebled if engines and pumps be used on wells with good springs in them. Thousands of acres at present given up to ragi, varagu, and other cheap, indifferent grains might be set apart for the raising of garden produce in the way suggested. At once the average gross value per acre would be raised from Rs. 10 to Rs. 150, or about fifteen times as much more.

Another point is, that very many thousands of acres of waste or jungle land which are culturable, might, with advantage, be brought under the plough in places where there is a good supply of sub-soil water, and if engines and pumps be utilised.* With the present great density of the population in certain parts of the country—a density which is increasing every year—the employment of modern mechanical appliance for raising water for irrigation, the substitution of superior for inferior crops, and the cultivation of every cultivable acre of waste and jungle land, are subjects of supreme importance for the State and for the public.

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* About 6¼ million acres of cultivable land are left unoccupied, and 5¾ million acres of occupied land are left uncultivated, or 12 million acres in all. Much of this land might be taken up and cultivated from wells.

But the question arises, can well-irrigation be really extended? Have data been tabulated about the nature of wells which can be relied upon? Has the amount of water which a well can supply been determined? Have the number of subterranean lakes which can be profitably tapped with wells been ascertained? The Government have done something to throw light on it in instituting a well pumping station at Melrosapuram. The Irrigation Commission Report refers to it in these words:—"We have had evidence of the successful working of a small oil engine, which was recently set up at a Missionary settlement at Chingleput; and we think that a few Government works of the same kind would not only give a useful lead to private enterprise, but would also result in the acquisition of very valuable information in regard to the irrigational requirements of dry crops.......... The records of pump irrigation are of exceptional value for experimental or statistical purposes ....Moreover, if the works are successful, it is but reasonable to hope that private enterprise will follow the example set by Government, and that work of this class may be multiplied."

To help to bring about this necessary development on a large scale it is essential for Government to lead the way, and establish a number of well equipped agricultural schools, such as Mr. Chatterton has sketched out in his interesting articles with the hope that leading ryots will follow and extend the improved methods of irrigation far and wide. He proposes to establish 150 of these schools throughout the Presidency with a view to show the ryots how to develop well irrigation and to grow valuable crops by taking advantage of modern motors and appliances for irrigation and agricultural purposes. These schools would act as demonstration farms for adult ryots and as training institutions for their children. He suggests that the schools might be carried on by District Committees, who could be directed or guided by an expert officer appointed by Government. He enters into detail as to the kind of men who should manage these rural institutions, and points out the necessity there is for obtaining a proper site for them, with plenty of water for irrigation. He adds that an engine and pump are absolutely essential, and also an aërmotor to supplement the engine-pump supply. At least 35 acres of land are required to give proper scope to these motor-pumping arrangements. The land should be cultivated by the pupils of the school as far as possible, and the whole concern should be run on commercial lines. Efforts should be put forth to improve cultivation in order to give an ocular demonstration to the ryots of the benefits to be derived from improved methods of cultivation and so influence them to go and do likewise, and thus increase their capital and their material happiness.

He advocates the opening of industrial classes in carpentry and iron work in connection with each of these rural schools so that the pupils may learn how to make and mend agricultural implements, carts, wheels, and water lifts, and also how to build houses. They should also be taught how to manage all kinds of agricultural machinery. The schools should also be the centres for ryots to bring their seeds and sugarcane to be crushed and their cotton to be ginned. A further development would be the establishment of gardens, orchards, poultry yards, and stock yards. He thinks that each school should be started on a capital outlay of Rs. 10,000 and believes that, if they are properly managed they will pay, and be excellent object lessons to those interested in agriculture.

Such schools should be established in each Taluk. Their educative value will be very great and widespread. Their successful establishment will give a decided stimulus to private effort throughout the country. These schools will be quite different from the experimental farms, and agricultural colleges, which are already in existence, and will be more easily seen and their influence will be more easily felt. Wealthier ryots could establish pumping stations for themselves, and train boys and labourers to manage high class cultivation, and even they might go the length of introducing electrical installations for driving electrical motor-pumps on all their wells within their estates, as has been done in the orchards of California. I would earnestly commend Professor Chatterton's scheme to Government and to well-to-do-ryots. The scheme is being carried out to a considerable extent already at Melrosapuram; several developments have still to take place, however. The Government have passed an order to establish five of these schools in selected places.

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II. WELL IRRIGATION.

THAT much has yet to be done to increase the area of cultivation and the productiveness of the soil in India is a truism which the people of the country are more and more beginning to realise. As agriculture is one of the most important branches of industry its improvement demands attention. The population is rapidly increasing under the protecting care and excellent administration of the Government. More mouths than ever have to be fed, and hence the need for producing more food from the soil is becoming more clamant than ever. The Irrigation Commission was appointed to try to point out how the problem can be solved.

Its Report is a monument of research, expert views, and far-reaching, clear-sighted policy. Its suggestions, when carried out, will benefit the country much and help to mitigate the horrors of famine in so far as they can be mitigated by the ingenuity and foresight of man. One of the things it strongly urges is the extension of well irrigation. It says that "it is certain that there is no single Province in which this form of irrigation might not be very largely extended with advantage," and that the construction of wells in all those tracts in which they can be usefully sunk should be liberally encouraged.

Well irrigation is no new thing. The use of wells for cultivation has come down from ancient times. It is difficult to trace back its history in this or other countries, however. Schrader in his " Prehistoric Antiquities of the Aryan Peoples " says that in the *Gathas* agriculture is put as secondary to cattle breeding, and that irrigation of the soil is not mentioned. He says it is different with regard to the Iranians, who were, as stated in the *Avesta*, settled agriculturists, and who practised irrigation with technical skill. When Alexander the Great was in India in 327 B. C. he dug large wells in the waterless parts near the mouth of the Indus in order to make them habitable. This is related by Arrian and the author of the *Periplus of the Erythraian Sea.* Layard tells us that Assyria owed its ancient fertility to artificial irrigation and that the people skillfully constructed machines for raising water to their fields, and he gives a picture of men raising water by means of picotas on the banks of the Euphrates, which was taken from one of the bas-reliefs found among the ruins of the great palace of Sennacherib, who lived 700 B. C. In Egypt well irrigation goes back to the time of the Pharoahs, or to times even earlier than this. The picota and the Persian wheel are seen there to this day in raising water from wells as was done probably 3,000 years ago. It was one of the pleasures of my life to look upon the luxuriant green vegetation in the valley of the Nile, being the result of irrigation by means of the water from the canals and the numerous wells which are in use. It was near Heliopolis that I got the idea of the Persian wheel, and the desire to introduce it in our settlement, in South India, and irrigate from one of the wells.

Though wells have been used for irrigation purposes in India for many generations, it is only in comparatively recent times that they have been extensively used in cultivation. In Bengal, on the West Coast, in Assam, and Burma they are not required, as a rule, on account of the copiousness of the rainfall. In other Provinces, however, they are much used, and form an exceedingly important factor in agriculture. Within the ten years ending with 1902 the increase in the number of permanent wells, as shown in the Irrigation Commission Report, is very great.

In Madras, Bombay, the Punjab, and the United Provinces of Agra and Oudh the increase is 366,095, or at the rate of 28·4 per cent. in the ten years. In British territory in these Provinces there are over 2,615,000 wells, which irrigate nearly 13 million acres, or about the half of all private irrigation works, or three-tenths of all State and private irrigation works put together. There is, therefore, a vast sum of money invested in irrigation wells, and this clearly indicates the immense value which the ryots put upon this particular branch of agriculture. Assuming that each of these wells cost Rs. 150 on an average to sink, the cost of construction represents a sum equal to about Rs. 39 crores.

Field wells are of great importance in ordinary years, but their value is vastly enhanced in years of drought. Some no doubt fail after a prolonged season of scanty rainfall, and through the lowering of the sub-soil level, but, as a rule, they do not fail at such times immediately and completely. In a dry year the tendency of the ryots is to give up raising valuable garden crops under wells, and take to raising ordinary cereal crops over a larger area around the wells. Mr. Mollison, Director-General of Agriculture in India, said to the Irrigation Commission that the well-irrigated area in the Bombay Presidency increased in the famine year 1899-1900 by about 100,000 acres, while the general irrigation area declined, and that the rice areas were largely unsown and the tanks throughout the Districts of Kaira and Ahmedabad, where three-fourths of the increase took place, were dried up. The ryots could cultivate from 10 to 12 acres under each well in the famine year, and raise three crops, on three different areas, such as cholum, wheat and *varagu*. There was no dearth of manure in the famine year and the crops raised were enormous. The fodder grown in Northern Gujerat at that time by means of the wells kept alive many of the cattle. Mr. Mollison also said :—" The value of cultivation of this kind in producing food for man and beast, in providing useful home labour and in keeping people off relief works cannot be lightly discounted. I believe that a *pukka* well could, with advantage, be constructed in every position occupied by a *kachcha* well in the late famine and in thousands of other favourable positions throughout the alluvial tracts of Northern Gujerat. Such wells would be uncommonly useful in an ordinary season and in a year of drought or famine would provide water sufficient for very extensive irrrigation."

In the Punjab, in the same famine year, the value of well irrigation was very strikingly exemplified. Mr. Sykes, Director of Land Records in that Province, furnished the Commission with tables giving full details for each District for eleven years. He took the year 1891-92 as a normal year, and 1899-1900 as a famine year in order to show the area under cultivation in a famine year as compared with the area of cultivation in a normal year under wells. The following is a summary of the tables :—

PUNJAB.	Normal year. (1891-2).	Famine year, (1899-1900).
(I) Fourteen Districts which maintained or increased the area under each well in the famine year.		
Number of wells	125,930	157,788
Total area irrigated by these wells ...	1,263,715	1,729,108
Average number of acres for each well ...	10	11
Increase in area in acres in famine year..	...	465,393
Increase in number of wells	...	31,858
(II) Fifteen Districts which decreased slightly under each well.		
Number of wells	148,836	190.840
Total acres irrigated by these wells ...	2,432.145	2,425,490
Average number of acres irrigated by each well	16	13
Decrease in area in acres in famine year.	...	6.655
Increase in number of wells	...	42,004

Thus the total number of wells at work in the famine year was close on 349,000, and the area irrigated by them was 4,155,000 acres, which is nearly equal to the area irrigated by the great State canals in that Province, amounting to 4,244,000 acres. This shows an increase of 73,862 wells and of 459,000 acres over the figures for 1891–02, and reflects great credit on the Punjab ryots and on the Administration which helped to produce this truly magnificent result. The blessing caused by it must have been immense. If the yield per acre under each well be taken at only Rs. 50 in the famine year, the enormous sum of Rs. 2,076 lakhs must have been put into the pockets of the cultivators who had the good fortune to possess such valuable wells, of which nine-tenths were permanent masonry wells. No more excellent example than this can be given in favour of well irrigation. Every successful well which is constructed helps to lessen the famine expenditure by the State, provides congenial work for the people at their doors, and prevents them from physical and moral deterioration.

III. EXTENSION OF WELL IRRIGATION.

ONE of the pressing needs of the day in India is the extension of irrigation by wells. It is a practical question and a question of ways and means. The possibility of constructing wells depends on the depth and nature of the underground water supply, and on the kind of soil in which they are sunk. It also depends on the means at the disposal of those who wish to sink them. In many districts in India there are numerous underground fresh water reservoirs, lakes or seas. These fresh water reservoirs do not consist of mere hollow places beneath the surface of the soil which are filled with water, but they consist of soil, sand, gravel, decaying rocks or other sub-soil material, which is saturated with water. Underlying this water is some impervious stratum of rocks, or stiff clay, through which the water cannot pass, and by which the water is maintained at a certain level in accordance with the season of the year. The largest of these underlies the surface of the ground in the great alluvial tracts between Peshawar and Calcutta, and may be called an underground sea whose water is inexhaustible. It is chiefly in the centre of this subterranean sea that water is raised for irrigation purposes. Between Delhi and Benares it is literally honeycombed with wells. In the North-West Provinces wells irrigate no less than 5¾ million acres. In the Madras Presidency such reservoirs or lakes occur along the low lying tract which runs down the eastern and south-eastern parts of the Presidency. They occur also in inland parts where depressions in the surface of the ground exist, and where hard rock or beds of clay lie underneath to conserve the sub-soil water. Further, in the paddy fields of the irrigation tanks these reservoirs exist under the fields, and under the surface of the sand in the river beds an abundance of water flows on slowly to the sea though not perceptible to the eye of man.

A survey of the existing wells and of the country so as to ascertain with precision where they might, with advantage, be sunk is needed. The sub-soil levels in December and June should be ascertained, and also the level in times of drought. A survey of this kind was made in 1883 in the country lying between the Ganges and the Jumna rivers in the Fatehpur District of the North-West Provinces. Five diagrams of cross sections in connection with this survey are given in Colonel Clibborn's "Roorkee Treatise on Civil Engineering" and these show the depth of the sub-soil levels in the hot and cold months of the year, respectively. A survey of this kind is necessary, and has been recommended by the Irrigation Commission. It should be undertaken by all Provincial Governments before any serious attempt be made to extend irrigation by wells on a comprehensive scale. The reason for this is that the underground level of water rises and falls during the year periodically, and depends on the amount of rainfall and the extent of percolation from the surface collections of water or from canals. It is always highest after the rains and lowest in June; but it reaches its lowest level after a series of years of scanty rainfall. The object should be to ascertain the lowest famine level, and then sink the wells lower than this in order to have a perennial supply, and thus be independent of the rainfall. The bottoms of many of the existing wells are higher than the famine sub-soil level, and therefore they fail in famine times. To deepen many of the present wells would be to tap an inexhaustible supply.

There is untold wealth to be acquired if the sub-soil water supply be tapped as it ought. More enterprise on the part of the ryots, and more determination to work hard so as to utilise the opportunities they possess in improving their condition, are wanted. The judicious advice and help of the Government are also required. If these be put into operation, there can be no question as to the beneficial results to the country which will follow. It is indeed sad to think that, in times of drought, no use is made of the many underground reservoirs, which, if tapped with proper wells, would make the iron-bound surface of the ground smile with waving green crops to feed the starving people around, and keep them from the relief works and from demoralisation in character. Every well which properly reaches the underground supply is a boon, and this boon cannot be over-estimated in a period of drought.

The smallness of means prevents many of the ryots from sinking wells. Pecuniary help, promptly given, is needed. Hitherto the Loans Acts in this Presidency do not seem to have been very popular. In 1902-03, for example, loans to the value of Rs. 64,871 were given for the construction of 371 new wells, and of Rs. 42,681 for the repair of 331 old wells. The area covered by these wells was 3,305 acres. This is not much for the Madras Presidency. There ought to be ten times the number of wells sunk every year. The depth of the sub-soil level frequently stands in the way of well construction. It will scarcely pay to raise water by means of indigenous contrivances if the level be much over 30 feet from the surface. In Coimbatore the spring levels run down to 35 feet, and in the Palladam Taluk they are 38 feet. In the Shahpur District of the Punjab the average water level is 25 feet, and in Gujerat the level is from 20 to 40 feet in favoured tracts. The same is probably the case in South India. In the paddy fields under the tanks the water level is only about four feet down, and in many instances the level in the cold weather is the same as the surrounding fields. The highest level in the engine well at Melrosapuram was nine feet from the surface in December last, and the lowest in May, seven months before, when it reached 18 feet from the surface—this well is not near paddy fields irrigated by a tank.

The difficulties in South India are nothing like those in the Bikanir State, where the average sub-soil level is 270 feet down. There the water is being profitably raised by means of electrical motor-pumps for irrigating the fields. In the Madras Presidency the water level seems to be fairly well situated in many places, and no insuperable difficulties in lifting it seem to stand in the way, and prevent the ryots utilising the existing underground supplies, with advantage to themselves.

Another obstacle in the way of well sinking is the lack of manure. This oftentimes is a real check. Though lifting from a well affords a sure supply, and though it never over-saturates the soil nor varies, it will not pay properly unless valuable garden crops are grown; and valuable garden crops cannot be grown without a plentiful supply of suitable manure. Such crops exhaust the soil, and abundance of manure must be applied to maintain the fertility of the soil. This is understood by all shrewd cultivators. But even if there be manure at hand the ordinary cultivator grudges the cost of manure, and never dreams of spending a large sum on manure in order to secure a large profit. Generally the method of cultivation is defective, and the yield in consequence is comparatively poor. In out-of-the way villages it is often hard to get a sufficient supply of manure, but in most places tank silt can be got. This is a valuable kind of manure, which should be used more than it is. Green manure may be grown and ploughed in. Mr. Mollison said to the Irrigation Commission:—"I can, from personal knowledge, state that, in every district where well irrigation is extensively practised, the dung and urine of cattle, litter, leaves, tank mud and other useful organic matter, household waste and in some out-districts night soil, are collected with scrupulous care and are much better conserved than before there was extension of well irrigation." Those who seek to irrigate by means of wells must act like this and conserve every kind of available manure.

One of the most beneficial ways of extending well irrigation is by adding largely to the number of supplemental wells in the *ayakats* or paddy fields of the irrigation tanks, and in the vicinity of the State irrigation canals. In the Madras Presidency in 1900-01 there were 33,174 tanks which irrigated over 2½ million acres in Ryotwari and Zemindary tracts. But irrigation under these tanks is very precarious, and entirely, or almost entirely, depends on the rainfall. In an ordinary year no difficulty is experienced, but when the rains are defective the crops cannot be matured without well water. In bad years the tanks are entirely dried up. In the paddy fields under the tanks the level of the sub-soil water is higher than it is elsewhere, because the underground water is not only fed by the rainfall, but also by percolation from the neighbouring tank. Canal engineers in the Punjab say that the canals have raised the underground level 10 ft. higher than it was before the canals were formed. This is true, I believe, in the tank *ayakats*. There is always abundance of sub-soil water under the paddy fields though in famine times it goes down some feet. Deep wells in the paddy fields have been found to be very serviceable in years of defective rainfall, and in the total failure of the rains.

In the Madras Presidency there are 144,000 supplemental wells but they do not appear to be uniformly distributed ; how this is so it is hard to understand. In the Madras Land Revenue Reports for 1902-03 it is stated that nearly Rs. 9½ lakhs were remitted in 1901-02 for waste, *shavi* or short crop, and *tirwakammi*, or the difference between wet and dry assessment. In the *Land Revenue Policy of the Indian Government* it is shown that between *faslis* 1261 and 1308, (1851-52 and 1898-99) the enormous sum of over Rs. 398 lakhs was remitted for waste on account of want of water. The remissions refer to land under the tanks, as no assessment is remitted for ordinary, "dry" land. In the great famine year of 1876-77 no less than Rs. 46 lakhs were remitted, because the tanks were empty. Now, had there been a sufficient number of wells in paddy fields under each tank and had they been deep enough to tap the inexhaustible supply which underlies them, such large remissions would not have been called for. That ryots are ready to work wells in such terrible emergencies as occur when periods of drought come can be easily proved. For example, the ryots in the Bahwalpur State found by experience that the water brought to them by the State inundation canals was an uncertain quantity, and that they had security from the use of wells, and could earn a good profit by their use. They accordingly sent in applications for *takavi* advances on loan to sink wells in their fields to the extent of Rs. 11 lakhs, and within two years they had received and spent Rs. 9 lakhs from State funds on this praiseworthy enterprise.

There ought to be a supplemental well for every three acres of the area under each tank. Every cultivator of tank-watered land should strive to have this ratio carried out. Three acres and a well should be his standard. In Northern Oudh a man will marry a grove to a well, and will not touch the fruit of the trees, nor drink the water of the well, till the marriage ceremony is performed. He links the two together. Why should the ryots of South India not link every three acres of their paddy fields to a well? If a well be dug for every three acres, it would protect the people against famine to a large extent. To effect this, however, there would require to be 859,000 supplemental wells, instead of the 144,000 at present. But it must be borne in mind that wells must be sunk below the hot weather sub-soil level to be efficient. Ryots, as a rule, are unable to sink them thus far on account of the great inflow of water. In one well not far from Chingleput six *picotas* at work vigorously could not keep down the inflow. Hence the deepening of a well can only be done effectively by means of an engine and pump, as we have proved at Melrosapuram. Government should employ a travelling staff of well sinkers who with portable engine and pump could complete the work at a reasonable cost when the ryot can go no further with his primitive methods. This should certainly be done in the paddy fields of the tanks, and so ensure a constant supply of water and be independent of the rainfall.

If such supplemental wells, as well as other wells in "dry" land be sunk, it would literally put hundreds of lakhs of rupees into the pockets of the cultivators, and secure to the Government the land assessment due for well cultivation. Wise initiative and guidance on the part of the Government and of all leaders of Indian thought are needed in order that this desirable and indispensable extension in well irrigation may become an accomplished fact in the near future.

IV. WELL IMPROVEMENT.

AS well irrigation is now an important factor in Indian agriculture it is expedient that it should be largely extended, and that each well should be made to do as much duty as it can. In connection with irrigation canals the cubic feet per second of the discharge which passes along the canal channel, and the number of acres which the discharge can irrigate, can be determined with precision. The number of acres irrigated is the measure of the duty of the canal. The duty of a well has hitherto been an uncertain quantity. The same precision, however, can now be determined with regard to wells by the method which has been adopted at Melrosapuram through the aid of Government. Ryots had no definite knowledge regarding the inflow of their wells. They merely sank the wells a little below the sub-soil level in the hot weather, and were satisfied with this. If they got enough water to irrigate the small area around the well which they thought they could manage to cultivate, they were pleased. They knew that whatever water they lifted in the daytime would be replenished in the night. As a rule they never enquired whether the quantity they took out could be increased and the cultivated area under the well correspondingly extended.

The duty of a well varies very considerably. In the Punjab in the famine year, 1899-1900, the average area under 148,000 wells was eleven acres, and for 201,000 other wells it was thirteen acres. This shows a wonderful high efficiency. In the North-West Provinces of Agra and Oudh the wells with 28 ft. mean depth of water from the surface, according to Colonel Clibborn, can by means of mhotes worked by cattle irrigate 8·80 acres; wells with 32 ft. mean depth, worked by men can irrigate 5 acres; and wells with 15 ft. depth with the picota, or *ratinam*, worked by men can irrigate 2·77 acres. In the Deccan and Southern Mahratta country a well with a single mhote will irrigate 3½ to 4 acres of ordinary crops, and 2 or 2½ acres of valuable crops. According to the Irrigation Report the average area for each well in this Presidency is 3·2 acres. Much in Madras has, therefore, yet to be done to improve the existing wells, and increase the area under each. What can be done in this direction? The Melrosapuram experiment can throw light on the methods required to bring this about.

The experiment began in March, 1902, on the central well of the farm. This well was 24 ft. wide at the mouth, 21 ft. wide at the bottom, and its depth was 23 ft. The place in which it was sunk was covered with jungle scrub, when the land was assigned by the Government for the purpose of founding the farm. The soil is red and passes into decaying and friable rock at the bottom of the well. The well was dug in 1893, and a picota put up to raise the water. After some time a Persian wheel was constructed of durable materials, which was able with a 12-ft. lift to raise 3,500 gallons an hour. When the water level went down some of the buckets had to be taken off to lessen the pull on the bullocks' necks, and this reduced the efficiency of the wheel to about 2,000 gallons an hour. With the Persian wheel the well was able to irrigate about five acres.

Then began the experiment under the supervision of Mr. Chatterton which lasted from March, 1902, to the 31st March, 1903. The object was to ascertain the amount of inflow of sub-soil water into the well. The picota and Persian wheel were worked day and night with relays of men and bullocks, but it was not found possible to unwater the well. The level was reduced to about 5 ft. or 18 ft. from the surface, and then remained stationary, the inflow being equal to the amount taken out. Mr. Chatterton then set up a $3\frac{1}{2}$ h. p. oil-engine and a 3-inch centrifugal pump driven by pulleys and belts, which soon emptied the well. The inflow at that time, which amounted to about 60,000 gallons a day was insufficient to keep the pump going properly. Arrangements were then made to increase the inflow. The well was deepened by sinking a small well in the bottom, 15 ft. by 7 ft. in depth, and then by running four adits or tunnels at the bottom of the small well, radiating in four directions. This made the well 30 ft. deep, and increased its area by 2,526 cubic feet, and produced a much greater hydraulic pressure at the bottom, and a larger collecting area.

The inflow was increased from 60,000 gallons to 100,000 gallons a day in the most favourable period of the year, in December, but on the 20th July, when it was tested, it had decreased to 67,000 gallons a day. The engine ran during the experiment for three periods daily of from two to three hours each. The water was pumped out and the engine stopped until there were several feet of water in the well. This was repeated day by day three times a day for eleven months. The average lift was 25 ft. and the cost was from Rs. 40 to Rs. 60 per mensem. The water was given free of charge to the boys of the Agricultural School and the tenants. It was found that it would not pay to cultivate paddy, *ragi*, *varagu*, and other inferior crops with water raised by an engine and pump, but that, if valuable crops were cultivated, a good profit would be got. On 1st April, 1903, the engine and pump were handed over as a loan, and the experiment was continued at the expense of the Mission.

The second stage of the experiment had now been reached, and the object was to find out how much area the pump could profitably irrigate, as compared with the lifting arrangements in vogue before. It was found that the area could be extended to about twenty acres, or four times the area irrigated by the Persian wheel. This result is of great importance in well irrigation, and of a most interesting character, as it shows what might be accomplished elsewhere in this country. Some of the data arrived at may be given. The engine was worked for 831 hours on 155 days from the 1st April to the 31st March, 1904, at a cost of Rs. 435. The excellent rain which fell during the period saved a good deal of expense, as for a considerable number of days the pump water was not required. The driver is one of the lads residing on the farm. He gets only Rs. 6 a month, and can manage the engine well. No special difficulty in managing the engine has yet arisen. If any breakage occurs it is immediately taken to Madras and repaired.

The average lift for the year was 24 ft. and more than seven million gallons were raised by the pump in all. On 194 occasions the pump emptied the well, and on 140 other occasions it partly unwatered it. It was found that, if there were 6 ft. of water in the well when the pump was started, and if this was emptied out, and the process repeated throughout the 24 hours, the maximum cubic feet of water could be got out of the well in a day. The absolute inflow could then be ascertained with precision. Two special observations were made to determine the amount of inflow—on the 24th December, 1903, and on the 6th April, 1904. On the former date the sub-soil level was at its highest, and on the latter it was approaching its lowest. Observations to ascertain the number of feet of fall of water when the engine was at work, and of the rise of water after it had stopped, were taken every hour for eighteen hours in December. In April the rise was only taken. These were plotted on section paper and the curves drawn. The December observations showed that the inflow amounted to 5,718 gallons an hour, and the April ones to 3,126 gallons an hour. By suitable pumping 139,000 gallons in the twenty-four hours could have been taken out in December, and 70,000 gallons in April.

A third experimental stage has now been reached. At about twelve yards from the engine well a large storage well has been dug and is nearly completed. It is 33·8 feet wide at the mouth, 30 feet wide at the bottom, and 30 feet deep. It is connected with the engine well by a tunnel, through which a man can easily pass. The area of the new well is 23,353 cubic feet. The object of the new well is to enlarge the collecting area and so produce a greater volume of water for the pump to raise in the morning when it begins the work of the day. The addition of this large well gives three times more work to the pump to do, and thus a larger area of cultivation will be covered. As soon as the well is completed it will be tested by means of the new measuring cistern recently built at the mouth of the engine well.

The three stages of the experiment are these :—

(*a*) The well as originally dug whose capacity was	...9 353	cubic feet.
(*b*) Additional through deepening and making the four adits	...2,526	„ „
(*c*) Additional new well in proximity to it	...23 353	„ „
Total area of the whole well system ...	...35,232	cubic feet.

Over 200,000 gallons can now be taken out of the well in twenty-four hours as compared with 60,000 gallons at the beginning of the experiment. The Melrosapuram well was but an ordinary well at the outset. Most wells could be improved in the same way, and made to do more duty. If an engine and pump be put up at a well, the well should be 12 to 15 ft. below the sub-soil level in June so that a sufficient supply may be got. To increase the supply to the maximum extent one or more storage wells should be sunk near the main well, and linked to it by an underground passage. This requires money, but it is money which will be easily recouped by carefully carrying on the intensive cultivation of valuable crops.

V. Results from Intensive Cultivation.

TURNING to the cultivation, which has been the outcome of the experiment in well improvement, the result has been satisfactory in so far as it could be determined in the first year when so much had to be done in forming the main and distributory channels, and in bringing the fields into the proper condition. When the farm was begun in 1893 the tenants cultivated paddy, *ragi*, *varagu*, and other ordinary crops on a *varam* rent, but got only from Rs. 15 to Rs. 20 an acre out of it. All was changed when a portion of the farm area was set apart for intensive cultivation under the pump. The greater part of this portion is cultivated by the boys of the Agricultural School, nineteen in number, under the supervision of a teacher and a maistry. The whole is superintended by the Rev. M. L. Jivaratnam, the Pastor. Valuable crops such as sugarcane, plantains, saffron, and chillies had to be raised to meet the cost of cultivation. The saffron from various causes was not a success.

With regard to the sugarcane and plantains it was different. Only 48 cents, or nearly half an acre, of the cane was put down to ascertain how it would grow in the soil of the farm. It proved to be a great success. It was planted on the 25th May, 1903, and up to the end of

March, 1904, the value of the cane was Rs. 254. The cultivation expenses were Rs. 110, leaving a profit of over Rs. 144. This represents a yield of gross produce of Rs. 530 per acre, and a clear profit of Rs. 300 per acre. The cane was sold chiefly for eating, which is the most profitable way of disposing of it. Had it been crushed and the juice turned into jaggery, the profit would not have been so much. As it is, the yield of the soil is therefore more than twenty-five times the amount which was taken out of the soil in accordance with the old conventional, poverty-stricken mode of cultivation everywhere prevalent in this country. The success in cane-growing may be attributed to the uniformity and regularity in the watering, the absence of water-logging, and the heavy manuring. In the 48 cents of land a hundred carts of tank silt and thirty carts of Municipal manure were used.

The plantains were also a success, but did not yield the same profit as the cane. Take the plot No. 48 containing 1·33 acres. It was planted in September and October, 1902, and received a hundred carts of silt and thirty-six carts of Municipal manure. It was watered regularly once in seven days. Up to the end of February, 1904, there was sold of the produce from the plot Rs. 272-13-2, and if the value of the young shoots, the cores and fibres in the stems, and the fibre and manure in hand be added, the total value, exclusive of the bunches on the plants, would be Rs. 351-2-6. The total charges for cultivation were Rs. 140-11-4, leaving a profit at the rate of Rs. 105-6-3 per acre per annum. Nothing in plantain cultivation is lost at the farm. The flowers and bunches of the fruit, the cores and fibre in the stems, the leaves of the shoots and the shoots themselves, and the manure which is got from the pulp and leaves which cannot be sold, are all utilised and turned to account. Whenever a bunch is cut down, the plant is also cut down and taken to the extracting knives, and the fibre is taken out and made into excellent ropes. As cane and plantain cultivation is an exhausting process, the yield for a number of years should be taken so as to get the average profit per acre. Rotation of crops has also to be taken into consideration.

With regard to sugarcane cultivation it can be profitably made into jaggery on an extensive scale without glutting the market. India is not producing all it needs, and has to import a large quantity. Mr. Tozer in his book on "British India and its Trade" states that 5¼ millions cwts. of sugar were imported into India from foreign countries to the value of over 3¾ million pounds sterling, or Rs. 565 lakhs, in 1900-01.

The imports of sugar are as follows :—

	1900-1.	1896-7.
Mauritius	£1,599,000	1,169.000
Austria-Hungary	1.032.000	87,000
Germany	305,000	584,000
China, Hongkong	384,000	119.000
Java	150,000	66 000
Other countries	300.000	76,000
Total...	£3.770,000	£2,101,000

There has been an enormous growth in the imports of foreign sugar during the past twenty-five years. During the five years ending with 1900–1 the increase was nearly 80 per cent. There is, therefore, a great field in India for the production of sugar, not only for its own consumption, but also for export to other countries. It would surely be an excellent thing if ryots were induced to grow more sugar, at least for consumption in India, and thus save the very large sum paid to foreign countries. If two or three million acres were set apart for this valuable crop in the Presidency, instead of the few thousands of acres at present under cultivation, a substantial increase to the incomes of the ryots would be the result. The poor ryot would have to exercise patience during the ten months or so the crop is being grown, and then he would be rewarded with a profit of at least Rs. 100 an acre on the area watered by his picota or mhote from his well.

The two examples given above show that sugarcane and plantain cultivation, if carried on by means of modern motor-pumping arrangements and carefully managed, is a profitable concern. There are few wells that cannot be improved. To carry on intensive cultivation, pumps are not required, and the ordinary lifts are quite sufficient. A man with three acres can take out of the soil with this kind of cultivation as much as a man with thirty can do in accordance with the ordinary methods. A great future is in store for the people, if they would give up their old methods, and take to more profitable methods, and utilise, if they can, modern appliances for raising water from the practically inexhaustible underground supplies under their very feet in many places. The average rainfall is a fixed quantity for each zone. It is often irregular and unseasonable in its appearance, and causes anxiety and loss. But whether it comes early or late, in large or small quantity, in any given year, a vast proportion of it finds its way down to the depths of the sub-soil, and there lies protected from the scorching rays of the sun at higher or lower levels, ready to be raised by the ingenuity of man to water and refresh the earth, and make it smile with waving green crops as food for man and beast. Untold blessing is to be got from well extension and intensive cultivation. May the people soon know this important fact, and eagerly desire to be possessors of wells, as their life and happiness in ordinary and in famine times depend so much on the food they are able to produce from the soil!

VI. The Plantain.

THE plantain has received considerable attention during the past few years. It is believed by some to have had its origin in the Euphrates valley several thousands years ago, and that its fruit was partaken of by primeval man in the garden of Eden at the very dawn of the human race. It has, therefore, been called the "Forbidden fruit," "Adam's fig," or the "Fig of Paradise." It has also been thought that its leaves were used as the first article of clothing. Whether this be so or not, it has been cultivated for many generations, and has spread to all the tropical and sub-tropical countries of the world. The plantains, or Bananas, of Fiji had a large sale in Australia up to the founding of the Australian Commonwealth, and those of the West India islands find their way in large quantities to the British Isles where they are bought for table consumption. The plantain flourishes in India, and has been prized by all classes of the people for many generations. It must have been cultivated in Vedic times for its many excellent qualities, as the Sanskrit language has a variety of names for it, some of which are exceedingly expressive.

It is called in Sanskrit *kadali*, or the water-leaf; *vrisha puspa*, or the sprinkling flower; *hasti vishani*, or the fruit which hangs like the elephant's tusk; *balaka priya*, or the fruit which all children are fond of, and long to eat; *rajestha*, or beloved of the king; and *vana bhusha*, or the ornament of the forest. There are many other Sanskrit names. In the Tamil language it is called *vazhei* which means prosperity. The stems of plantains are cut with the fruit and leaves adhering to them, and set up at the doors or porches of houses on marriage and other festal occasions throughout South India as emblems of fertility and prosperity. Their use at such joyful times is considered indispensable to the happiness of the people concerned.

The regard which the people of this Presidency have for the plantain is shown in the proverbs in use. The saying, *ezheikku vazhei* is one which means that the plantain is the poor man's crop—that, if he plants and cultivates a few, he can earn his living. The meaning of another proverb is that plantains should be dug six times and watered a hundred times, implying that the hoe should be freely used in digging the soil about the roots of the plants, and that the plants should be sufficiently watered, because that only in this way can plantain cultivation be made to yield a profitable return.

Another means that there is treasure in the cultivation of plantains and a potful (of money) in the cultivation of gardens. A Telugu proverb says that the gardener knows the taste of brinjal, and the king knows the taste of plantain. A Tamil proverb looks upon the plantain as a kind of divining tree; it says, put down a plantain tree and find out the future of a family. The current belief is that plantains put forth their bunches of fruit towards the north, but if they appear in any other direction it is ominous for the family. It is currently said that, if the bunch faces the north, the plant will flourish; if towards the east, the planter of the tree will prosper; if towards the west, the tree will die; and if towards the south, the planter will die. But this can hardly have any effect in large plantain topes, as there will be hundreds of trees whose bunches will be facing in the right direction and hence will neutralize the bad effects of those that face in the wrong direction. The wit of the Dravidian seems to have been nodding when it promulgated such proverbial lore. At all events the fruit laden plantain stem at the door of marriage chamber is emblematic of the greatest prosperity and good luck, which is certainly a very pleasing thought to the happy couple who are entering on a new phase of life.

The uses to which the plantain can be put are numerous and varied. In itself the tree has an attractive appearance to the eye. Its young leaves have a beautiful shining green, and are used for plates by the Brahmins and other high castes for their food, and by many for dressing blistered surfaces of the body. They have always a cool fresh look about them and hence some use them for a shade for sore eyes. The sap of the fresh stem is sometimes used to quench thirst in cholera cases, and the unripe fruit in diabetes. The fruit is eaten raw when ripe, or is boiled and put into curry, or is roasted and prepared in various ways. Sometimes the fruit is skinned, sliced and sundried, and pressed together. In this way it can be kept a long time and used as an article of food, or it is pounded and made into flour, or meal, and used for cooking various kinds of wholesome and palatable dishes. It can also be made into a beverage, and into a kind of wine by a process of fermentation. The ripe fruit is a useful portable kind of food for Brahmins when travelling as they are not put to the inconvenience of cooking food for themselves, or of taking food from others lower than themselves in social status and thereby spoiling their caste. The fruit contains much that is nourishing, and can be eaten without inconvenience at the time. It can be so easily peeled, and is unlike many other fruits that require some manipulation to get them prepared for use. When the fruit of the best kinds of plantains, such as the *rustali* or the *bengala vazhei*, is taken when properly ripe from the tree direct, and mashed with a fork on a plate with a plentiful supply of milk added to it, a most delicious dessert is obtained—a dish which the Mahomedans are said to be fond of. It certainly takes a good deal to beat it, and many Europeans now eat the fruit in this way. Indeed, the lactic acid of the milk seems to go well with the acid of the plantains, and so renders it more fit for digestion. Some Europeans cannot eat plantains unless prepared in this way.

But the flavour of the plantain is too often destroyed by the useles and harmful practice carried on by certain fruit-sellers in firing the fruit so as to force it to ripen. This practice is to be deprecated and should, without hesitation, be put a stop to as soon as possible. It is only done for table-plantains, and never for the green fruit which the people of the country use for their curry. If housewives would deliberately set their face against this practice, and refuse to buy forced plantains, it would soon come to an end. Butlers and cooks who look after the table supplies should be instructed not to buy forced plantains.

Further, the centre of the stalk and the end of the flower are used as vegetables and put into curry; while the dried leaves are taken for packing purposes and for rough cordage. The stem is sliced into strips and the fibre is extracted to be made into cords and ropes.

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VII. Plantain Fibre.

THE plantain fibre industry in South India promises to become a profitable business. Enquiries as to how to extract it have reached me from various quarters, showing the interest that is now being awakened to the value of the once discarded plantain stem after the precious fruit has been cut off. It used to be thrown on the rubbish heap as utterly worthless. But it is different now, since cultivators have begun to realise how much they were losing by their former wasteful practice. The fibre can be made into ropes or woven, into cloth. At the Melrosapuram Agricultural School, near here, the fibre is being extracted and made into ropes.

It may be interesting to some to learn something of the nature of the fibre which is being extracted. Some time ago a piece of rope was sent to me from the above school. Another piece of rope was sent to me by the Deputy Superintendent of the Chingleput Reformatory School—this was made of hemp in Calcutta. These two ropes were tested by me to ascertain their breaking tension strength. The following is the result:—

Plantain fibre rope.	Hemp rope.
Length, 122 yards	14 yards.
Thickness, 5/16ths of an inch	9/32ods of an inch.
Weight, 83 pallams, or 6 lbs. 10¼ ozs.	10 pallams, or 12½ ozs.
Breaking tension, 230 lbs.	286 lbs.
Price, Re. 1 per viss, or 3 lbs. 2 ozs.	Rs. 1-4-0 per viss.

It will thus be seen that the hemp rope is somewhat stronger, but is 20 per cent. higher in price. The strain which the plantain fibre bore is remarkable, and it shows that plantain fibre rope is about as good for all practical purposes as the hemp rope. Its durability and powers to resist wear and tear have yet to be put to the test, however. My impression is that a fibre which can bear such a high tension will be found to be durable. This fibre has a white, glossy appearance, and the ropes made from it have a very attractive look.

Each plantain stem can produce on an average about 4 ozs. of fibre, and 600 plants can be grown on an acre. Each acre will, therefore, produce 150 lbs. or 48 viss, of fibre. This at Re. 1 per viss will give Rs. 48 per acre. A boy on 2 annas wages a day can extract fibre from five stems. An acre will give him work for 120 days, and this will cost Rs. 15. The charge for spinning the fibre into ropes by hand is about 6 annas a viss. And hence it will take Rs. 18 for wages for a man to spin the fibre got from an acre. This could be done much cheaper by a spinning machine and in a shorter time. The hand process takes 120 days for an acre. If the expenses incurred in extracting and spinning the fibre be deducted, the sum of Rs. 15 will be got as profit from an acre of plantain cultivation. This amount of clear profit is as much as the average value of all food-crops grown in

South India, per acre, and is a distinct addition to the income derived from the plantain fruit and shoots. Besides, the refuse from the stems when the fibre is being extracted, the leaves, and every other thing connected with the plantain, are returned to the soil as manure. Only the fruit and the fibre, with some of the tender leaves and the tender heart, are taken and sold. Thus nothing is lost in this process.

In addition to the saving and profit got from the fibre produced by an acre of plantains, two hands are employed for 120 days each, thus providing two new occupations. Plantain gardens, if managed as they ought to be, can be very profitable, and become a constant source of income while they are under cultivation. Turmeric takes about a year to reach maturity, and so does sugarcane but once a plantain garden begins to bear fruit the fruit on all the trees does not mature at one and the same time. Some bunches appear before the others, and hence there is a constant maturing of bunches one after the other going on. These are sold as they reach the stage when they can be cut from the tree. In this way money is constantly coming into the hands of the cultivator, which is very gratifying to him. It is not so with other products of the soil. Plantains are universally used for curry, and hence there is a constant demand for green fruit from plantain gardens.

VIII. PLANTAIN FIBRE EXTRACTION.

FROM the enquiries made from Calcutta and Behar it is apparent that growers there are still carrying on the wasteful practice of casting the stems on to the rubbish heap after the fruit has been obtained. Such questions as these are being asked:—How is the fibre extracted? Is it the stem that is used after it has fruited? From what part of the stem is it taken? Is any particular kind of plantain required? What can be made of the fibres, and where can they be sold? A Calcutta gentleman writes:—"I have extensive plantations, but hitherto I have not done more than sell the fruit and the leaves. As the extraction of the fibre promises to become a profitable industry, I should like to make myself acquainted with the process. Will you, therefore, kindly favour me with the information I seek?" Another writes:—"On one point I require more information than what you have been pleased to furnish; I mean that the process of extracting fibre has not been as clearly explained as to enable a general reader to try his hand at the new enterprise by way of experiment. I shall feel highly obliged if you would be so good as to publish another letter throwing light on this point for general information."

With regard to the particular kind of plantain which can be used for extracting fibre from, the best is the *Musa* *textilis*, or Manila hemp plantain, so extensively grown in the Philippines for fibre alone. Its fibre is stronger and better than that of any other species. It cannot, however, be grown for its fruit, as that is worthless. On this account it would not be a profitable industry in India, where the climatic conditions are less favourable for its culture than those existing in the Philippines. Another reason against its introduction into the existing plantain topes is its tendency to spoil the fruit of other plantains which are grown for their fruit. Of this a certain writer says:—"It is useful in the garden if much grafting is done, because the fibre in the leaf stalk is stronger than that of the common banana, but it should not be planted where the plantain is grown for fruit, because its pollen will fertilise the ovules of the other species, and the result will be abundant, hard, black seeds as large as a pea in the fruit that without fertilised ovules are such delicious fruit." Great care, therefore, should be taken by those who cultivate plantains for fruit to exclude the *Musa textilis* from their gardens. It might be tried on the West Coast for its fibre alone, where the rainfall is abundant, and where it might be made to pay. But I fear that plantain growers must be content with the ordinary species for fibre and fruit, as well as for the many other uses to which the plantain tree can be put. The return that the ordinary species gives for the labour expended on their cultivation is sufficiently encouraging and hence the most should be made of them.

The following are the species which are most frequently grown, and which are being cultivated in our school farm:—*Bonden*, *Kattei bonden*, *Rustali*, *Pey vazhei*, *Puvazhei*, *Raja vazhei Nir bonden*, *Sevvazhei*, *Pacchei vazhei*, *Uthira vazhei* and *Bengala vazhei.* There are several other varieties besides these. One of the most notable is the *Morisu vazhei*, or the Mauritius plantain, whose botanical name is *Musa cavendishii.* It is a dwarf plantain and seldom grows more than 6 ft. in height. It thrives well, and is surprisingly productive, having very large bunches for its size. Some of the bunches are so heavy in our garden and hang so far down as to touch the ground. Though the dwarf species is so productive of fruit, it is deficient in fibre, owing to the shortness of the stem, and it will hardly pay to extract it, if this species be cultivated only. The short stem, however, can be taken and the fibre extracted from it along with that of the other kinds.

It is the stem that is taken after the fruit has been cut off and cut into lengths of about 3 ft. These are then divided into strips about 2 ins. in width and placed at the side of the machine for extracting the fibre. These strips are taken one by one and put under the knife and pulled through. Each strip is pulled through several times until all the soft stem-substance is removed from the fibre. The fibre is thereafter dried in the sun and put aside for the manufacture of cordage and ropes, or is taken and woven into cloth where it is possible to do so.

It is rather difficult, in the absence of diagrams, to describe the machine, which I understand is largely used in the Philippines to extract the Manila fibre. It is a simple contrivance. For a full description of it I would refer all interested in the subject to the Bulletin written by Mr. Proudlock, Curator of the Government Botanical Gardens, Nilgiris, and sold by the Government Press, Madras, for a few annas. It contains all the information needed, and has diagrams to illustrate the remarks made about the machine. The principal part of the machine is the knife, which is about 4 ins. broad and 36 ins. long; half of this length forms the blade, and the other half the handle. The handle springs from the blade at an angle of about 30°, the handle and the blade forming one continuous piece of iron or steel. To get an idea of the shape of the knife a two-foot measuring rule with hinge may be taken and opened out to its full length and placed on a table. One-half should be held by the one hand and the other half held by the other hand; then one side of the rule should be raised up till an angle of 30° be formed, when the shape of the fibre-extracting knife will appear. The edge of the knife must be blunt, and must rest on an iron plate, which must be exactly parallel with the blunt edge of the knife so as to fit very closely to it. The iron plate should be $\frac{1}{4}$ in. thick and 15 ins. long and 3 ins. broad. This should be fixed with screws to a cross beam of any ordinary kind of wood. This beam should be held up from the ground about 3 ft. by two upright poles firmly fixed in the ground.

The knife has a hole in the centre close to the point where the handle turns up from the blade into which a bolt is put, thereby making this the pivot on which the knife moves. To hold the knife, a piece of wood is fixed into the cross beam, having a groove in it, into which the knife is put, and the bolt put through. This secures the knife in its place and allows it to work. A few inches along the handle another piece of wood is fitted into the cross beam, having also a groove in it in which the handle works. This is to prevent the oscillation of the knife sideways when the knife is in action. Then at the end of the handle furthest away from the blade there is a hole to which a rope is tied; this rope goes two ways, upwards to a bamboo spring to which it is fastened, and downwards to a foot-pole on the level, or near the level of the ground. The spring is made with an ordinary piece of bamboo, which is fastened to poles fixed in the earth.

The spring has an upward pull, and keeps the knife tight on the iron plate, and can be regulated by shortening or tightening the rope that connects it with the knife.

When a strip is taken to be extracted, the foot is placed on the foot-pole and pressed down, this has the effect of opening the knife. The half of the strip is placed under the knife, the foot is taken off the foot-pole and the knife closes tight on the strip. The strip is then pulled through several times, as mentioned already. The other half is treated in the same way. I am not satisfied, however, with the machine, as it is somewhat wasteful of the fibre. It appears to me that the loss of fibre it causes might be saved by the use of some device which will loosen the stem-matter from the fibre before the knife is put in action, and thus make it easy for the knife to extract *all* the fibre in the stem without any loss whatever.

The fibre of all the plantains cultivated for fruit is useful for making cordage. Once the public realise that cords and ropes made from this kind of fibre are strong and can be utilised for the many purposes that hemp ropes are used, they will not hesitate to spend money in buying them. There is an extensive market for ropes in India, and then there is the demand that may be created in European countries for the fibre as soon as a sufficient supply is forthcoming.

CHAPTER III.

THE LAND REVENUE PROBLEM.

GOVERNMENT AND ITS LAND REVENUE.

I. Assertions by Critics.

THE question of Land Revenue Administration in India is attracting much attention; and rightly so, as the greatest bulk of the Government revenue is derived from the cultivation of the soil, and as the welfare of both the Government and those dependent upon agriculture is bound up with the principles in force in connection with the land revenue. There is, however, not much enlightened opinion on the subject among the great majority of the people. The ryotwari landholders have somewhat decided views as to the action of the Madras Government in undertaking land survey and the re-settlement of the different Districts at periodical intervals, in order to revise the rates which ought to be paid to Government as the over-lord in the cultivation of the land. They unquestionably admit, as was admitted in the days of the rule of the Native Princes, that the Government has a right to take a certain proportion of the land produce as its legitimate share, but when it comes to a question regarding the proportion they have to pay for cultivation, and the advisability of revising the rate after it has once been fixed, differences of opinion arise. Some recent re-settlements, notably that of Tanjore, in which the revenue assessment was raised from Rs. 41 to Rs. 53 lakhs, started considerable criticism, and caused some to consider the action of Government as unjust and unreasonable.

During the period of 38 years, from the time the Godavery settlement was inaugurated in 1862 to the completion of its re-settlement in 1900, the total enhancement of the revenue assessment amounted to Rs. 31·5 lakhs for the Presidency. This certainly is a large and substantial increase and the question arises as to whether the Government is justified in taking such an additional sum from the ryots. Was the Government right in increasing the land revenue? And if so, were the rates of assessment levied too high to suit existing circumstances? If we believe Mr. Romesh Chunder Dutt, C.I.E., and his friends, the answer must be that the Government committed a grievous financial sin in raising the land assessment, and in adopting a periodical settlement of the amount the ryots should pay as land-tax. Such critics never fail to speak of the deplorable condition of the ryots, of their poverty and widespread indebtedness, and of their helplessness, as the result of the unwise action of Government in connection with land revenue administration. Mr. Dutt has asserted that the right of the Madras cultivator to a fixed assessment has been practically confiscated by the British Government, and hence the land he cultivates "is subject to enhancement at each recurring settlement," and so he "has been reduced to a state of poverty and indebtedness which makes him an easy prey to famines in years of bad harvests." In the October number of *The Indian Review*, 1902 he reiterated his criticism and stated that it was wrong for the Government to abandon the principle of a permanent settlement and to refrain from giving pledges regarding enhancement; for "the Secretary of State did not see, and the Indian Government has not understood since, that it is more dangerous not to give the cultivators of India some pledges against uncertain demands, some intelligible grounds for enhancements, at recurring settlements. In the absence of such a pledge, the Madras cultivators, who pay the revenue direct to the State, suffer to this day from two of the greatest evils which can afflict agriculture in any country in the world, *viz.*, over-assessment, and uncertainty in the State-demand". He further said that Lord Curzon "has left the peasantry of Southern India in that state of *uncertainty* which is ruinous to agricultural industry all over the world."

These assertions, if true, are enough to brand any Government as being unenlightened, unjust, and unprogressive. But with the facts, as revealed in Government Reports, and in a study of the social and economic condition of the ryotwari landholders in this Presidency, and of the prices of land and of grain at the present day, it is impossible to understand how Mr. Dutt could have come to the conclusion he has arrived at. The facts are entirely against him. No doubt there is plenty of poverty in South India. The landless labourers, and the toiling sub-tenants, are all in a chronic state of poverty; but that is not caused by the rapacity of the Government, nay, rather, it is caused by the heartlessness and cruelty of the great majority of the landholders, who keep them ground down in hopeless subjection, granting to them the merest pittance for their hard labour in the fields, or barely enough of the gross produce to enable them and their families to subsist upon it comfortably. This is a hard fact in South India, and is a well known practice of peasant landholders in other parts. It has always been so in this country, and was terribly pronounced in the old days of native administration, long before ever the British became the paramount Power. An impartial investigation of the whole question, even by those not connected in any way with the Government, must lead them to see that the contention of Mr. Dutt and his friends is wholly wrong and misleading, and that the Government's position is a strong one, and practically unassailable.

II. THE GOVERNMENT POLICY.

THE Resolution of the Madras Board of Revenue of 6th December, 1900, which was endorsed by the Government of Madras on 13th March, 1901, is an able and crushing reply to Mr. Dutt and his supporters. The Government of India also in its Resolution of 16th January, 1902, deals with the question as it affects the whole country, and gives an authoritative exposition of the principles of the land revenue administration of India with a fulness and perspicuity which ought to be convincing, and which should be well pondered by those who are criticising. An unbiassed and thorough examination of those principles and of the details of the Land Revenue Administration in Madras leads to the conviction that Madras Government has been very considerate and lenient in its action, and that it would not be doing its duty were it to abolish periodical land settlements.

India is a country which has been cast in a conservative mould, and in consequence has remained in an unprogressive, backward condition for many centuries, retaining the crude, unenlightened principles of ancient times until the advent of the British Power. The Government needs a free hand to adjust its revenue policy to suit the wants of the country from time to time. The administration must have sufficient elasticity so as to harmonise with a gradual improvement in the methods of agriculture, with the taking up of the waste lands which can be profitably cultivated, with the enhanced value of the land, and with any advance in the price of food grains that may have taken place. The share in such enhancement should be reciprocal for Government and ryotwari landholders alike.

The critics hold that all the value of the enhancement should belong to the ryots, and that the Government share should be permanent, notwithstanding the fact that it has been through the Government's wise and farseeing policy of spending many crores of rupees in developing the resources of the country, and in introducing its splendid irrigation projects, that any improvement has taken place. In 1869 the late Duke of Argyll, in a despatch to the Government of Madras stated clearly the opinion of the Home Government with reference to the permanency of the Madras land assessments. He says that they were precluded from relinquishing the "Government share of the increased value which has been conferred on the land by improved administration, the construction of public works, especially works of irrigation and railways, together with the improved price of agricultural produce." This is a sound revenue policy, and it is pleasing to consider how well the principles of such a policy were so firmly grasped by the authorities thirty-five years ago.

For the first half of last century no continuous, homogeneous policy was in vogue. Many mistakes were made by those in authority during that trying and eventful period. For the greater part of this period the assessment was excessive, and resembled severe rack-renting. At first there was practically no difference between the native rulers and the British in the methods of taxation. The legacy left by the former had been very galling to the peasantry. The British simply took it over on the assumption of power; but with a wide difference. The result, at first, so far as the ryots are concerned was the same. They for a time continued to be oppressed. The British, however, had a desire to make things better. Measure after measure was tried with a view to improvement. The farming out of the revenue was tried, but this led to greater hardship than ever. Administrative reforms succeeded, and these were resisted by the Poligars by force of arms. The permanent settlement system of Bengal was tried on a limited scale, and some Zemindars were invested with authority over the territories bestowed upon them, and required to pay yearly a stated fixed assessment to the ruling power. The village lease system was also tried with ruinous results.

To give an idea of the nature of things during this period it may suffice to give an example of what must be termed severe rack-renting. In 1819 the Collector of Masulipatam estimated the ryot's profit on "wet" land in the Zemindary villages in the Kistna delta to be only Rs. 10 out of a gross produce of Rs. 160. The Government assessment and other taxes took away Rs. 107 from this sum, showing a percentage of taxation of over 66.

But this was perhaps mild to what was the state of matters in Cuddapah some years previous to this. Sir Thomas Munro, writing in 1801, described it thus:—"The ten years of Moghul government in Cuddapah have been almost as destructive as so many years of war, and this last year a mutinous unpaid army was turned loose during the sowing season to collect their pay from the villages. They drove off and sold the cattle, extorted money by torture from every man who fell in their hands and plundered the houses and shops of those who fled; by which means the usual cultivation has been greatly diminished." Munro was sent to Cuddapah and the other Ceded Districts to put things right. "By the end of 15 months, which he served in that District," writes the late Dr. Bradshaw, "he had reduced it to a state of order; the bands of freebooters were put down, the ryots, assured of justice in the collection of the taxes, and free from the fear of plunder, resumed their habits of industry, and good government was established throughout the Province." Munro set about getting the heavy taxation reduced. By the year 1822 he managed to reduce the rate on "wet" land by 25 per cent., and on "dry" land by 33·3 per cent. To add to the burdens of the ryots there occurred no fewer than four disastrous famines between 1799 and 1824. As a result most of the substantial ryots were reduced to poverty, or had left their villages, despairing of ever being able to carry on agriculture so as to afford them sufficient remuneration for their toil.

From 1824 to 1854 the country suffered from agricultural depression from various causes. The principal were excessive taxation, unfavourable seasons, a continuous fall in the price of food grains, an inadequate currency, an undeveloped export trade, and the absence of proper roads and means of communication. During this period of 30 years the Government endeavoured to ameliorate the condition of the people by the abolition of many different kinds of taxes, the reduction of land assessment, and the inauguration of the Cauvery, Godavery, and Kistna irrigation schemes, which have brought much wealth to these favoured Districts. The numerous remissions and reductions in the assessment amounted to 25 to 37 per cent. The taxes that were abolished were exceedingly varied, and must have pressed very heavily upon the whole population. A few of them may be mentioned. There were taxes on priests, shepherds, fishermen, dry fish, horned cattle, looms of Pariahs, huts of toddy drawers, grazing, collecting cow-dung, goldsmith's ashes, and skins.

There were also presents made to Zemindars at the Dusserah Feast, grain allowances given to Brahmins, blackmail to Kallars, offerings to pagodas, and grain allowances to the village goddess, which were abolished; as well as land customs, the tobacco monopoly, and other miscellaneous taxes. The total amount of reduction in those 15 years was over Rs. 68 lakhs. This certainly showed that the Government was anxious to relieve the burdens which had been handed down from its predecessors.

III. Rates of Assessment.

LET us look at the actual rates of assessment at the beginning of the last century and compare them with those nearer our own time. In 1805, in the southern portion of the North Arcot District the average assessment for "wet," "dry" and "garden cultivation" per acre was Rs. 15-3, Rs. 13-12, and Rs. 18-9, respectively, whereas, after the new Settlement in 1871, the average for "wet" land was Rs. 4-15-2 per acre, and only Re. 1-4-2 for "dry" land, including "garden cultivation." Thus the Government land revenue system was made to suit the requirements of the times as much as possible. To have given permanency to the excessive, rack-renting taxation, which prevailed at the beginning of the century, would have been most disastrous to the well-being of the great mass of the population.

We come now to the latter half of the last century. It has certain well defined characteristics of its own. From 1855 onwards prices began to rise. This tended to hinder any further great reduction in the assessment. The average assessment per occupied acre then was Rs. 2-7-0, while in 1898 it stood at Re. 1-13-11. The rise in prices was enormous. If the four years, 1851-55, be taken as the starting point, the rise up to 1897-98 was 145 per cent., or nearly one-and-a-half times greater. This rise was all in favour of the ryot, seeing that he had to pay the assessment in money, and got more money for his grain.

With regard to the Government demand the maximum is fixed at half the net produce. This is arrived at by taking the gross produce of the field, and deducting from it a certain percentage for cultivation expenses, merchants' profits, and unfavourable seasons. The remainder is the net produce, the half of which goes to the Government as land-tax. The difficulty lies in calculating the grain outturn per acre and the current price of the various kinds of grain. The Standing Orders of the Madras Board of Revenue on this point are full and comprehensive, and evince an anxiety to deal fairly by the ryot and not to over-reach him in any way. The rule is "the Settlement Department divides the soils into certain classes with reference to their mechanical composition, sub-divides them into sorts or grades with reference to their chemical and physical properties and other circumstances affecting their fertility, and attaches a separate grain value to each grade after numerous examinations of the actual outturn of the staple products in each class and sort of soil. The grain value is then converted into money at the commutation price, based generally on the average of the 20 non-famine years preceding the settlement for the whole District, with some abatement for traders' profits and for the distance the grain has usually to be carried to the markets; and from the value of the gross produce thus determined, the cost of cultivation and a certain percentage on account of vicissitudes of season and unprofitable areas is deducted and one-half of the remainder is the maximum taken as assessment or Government demand on the land...."

The commutation rate has always been purposely made much lower than the average prices of grain in order that the assessment may not be unfavourable to the ryot. For instance, the price of paddy in the Salem District at the time of settlement in 1870-74 was Rs. 136 per garce of 4,800 seers, which is equal to 9,800 lbs. in weight. The commutation price, as calculated according to rule, was Rs. 123 per garce; whereas, the commutation price as fixed by Government was only Rs. 100 per garce. This is a fine illustration of the fairness and generosity of the Government. It in reality amounts to a substantial reduction of 36 per cent. in favour of the ryot. But we might proceed a step further and ascertain the prices prevailing some years after the settlement, say, in the ten years ending in 1899. The average price of paddy in these years was actually as high as Rs. 198 per garce, or 98 per cent. higher than the rate fixed by Government, thus showing that the ryots were only paying about half the assessment they ought to pay were the Government carrying out strictly the rule to take the half of the net produce. The truth is, rising prices are all in favour of the ryot, as the Government rate is fixed till the next re-settlement is undertaken.

The Board of Revenue gives two hypothetical illustrations of this important fact—a fact which is either forgotten, or not understood, by those who criticise. "Let it be assumed," the Board says, "that, as alleged in Trichinopoly, in 1861-62 the settlement assessment formed 30 per cent. of the gross produce at commutation rates; each ryot then retained Rs. 70 out of every Rs. 100. But let a rise in prices be assumed, as actually happened; then, as soon as prices increase by 30 per cent. the ryot is practically, save for sundry cash expenses, as well off as he would have been previously without any Government assessment, for he will enjoy Rs. 100 net on the same amount of produce; when prices have increased by 75 per cent., he will enjoy Rs. 145

instead of his previous Rs. 70. Such a rise actually happened after 1855....Another illustration on hypothetical data may be given. Let it be supposed that in 1850 ten million acres produced crops worth, at then prices, 15 crores of rupees, and paid Government three crores as assessment: the ryots would then have retained 12 crores net. But in, say, 1875, under the effect of risen prices, let the produce on the same acres be worth 25 crores, the assessment theron remaining practically constant; the ryots then would retain not 12 but 22 crores for themselves." These figures are within the facts, and make manifest what an enormous wealth has come into the hands of the landholders in recent years through the rise in the prices.

To understand fully the reasonableness of the action of the Government in increasing the assessment the case of Tanjore may be taken as an example. The settlemant took place in 1893-94 and the resulting increase was Rs. 12 lakhs, which to many minds appeared to be inordinately excessive. It, however, was not really so. Government has been abundantly justified in raising the assessment in that part of the country, which is being well watered by irrigation channels from the Cauvery made at the expense of the Government. So much so is this the case that Tanjore has been well named the "garden of South India." The commutation rate in Tanjore had been fixed at far too low a figure, *viz.*, at Rs. 56 per garce, the reason being that prior to 1853 it had been based on commutation rates that "were the average of long series of very low priced years, and were correspondingly low." The settlement of 1893-94 fixed it at Rs. 121 per garce. This was much lower than it might have been made had Government chosen to adhere to its rule. The calculated commutation price was Rs. 142, while the average price of paddy at the time was Rs. 158, and was still higher during the ten years ending in 1899, when it reached the high average of Rs. 178 per garce. Another reason for the increase was the necessity of charging for the supply of water. Had Government resolved to charge the Tanjore ryots at the maximum rate of the half of the net produce they would have had to pay as assessment 16½ lakhs instead of 12 lakhs.

IV. THE CHARGE FOR WATER.

THE expansion of irrigation in Madras, on which the Government has expended much capital, has from 1851 to 1895 been enormous, representing an increase in charges for water of 222 per cent. Of the Rs. 426 lakhs of ryotwari demand made in the years 1891-95 no less than about Rs. 182 lakhs are charged for water. But this water-charge cannot be regarded as assessment. It is simply a rent for the supply of a valuable commodity, without which the cultivation of certain lands would be practically impossible as a profitable transaction.

Moreover, through the large amount of capital spent by the Government for irrigation purposes the supply of water has greatly raised the selling price of land, and added vastly to the wealth of the landholders. The occupancy of the land has, owing to the better conditions prevailing, enormously increased during the past half century. The acreage under cultivation rose from 12·5 million acres in 1851-55 to 21·5 million acres in 1898-99, or nine million acres of an increase in all. This is eloquent testimony to the improvement that has taken place during those years. The Board of Revenue says the statistics "show that the area in occupation has, notwithstanding the set back of the great famine of 1876-78, increased very largely: that the assessments on the land have not kept pace with this expansion, and that much of the more recent increase is due to the inclusion of charges for water and to the re-settlement of the very rich District of Tanjore; that the assessment per acre is far lower than it was forty years ago, though, for the reasons just stated, it has somewhat increased in later years; that the pressure of the assessments has, owing to the doubling of the prices, immensely decreased; that the total ryotwari land revenue demand is spread over a far larger area that at first sight appears; and that the incidence thereof represents a demand of from 30 to 40 seers of grain per acre only, on the average prices of the Presidency during recent favourable years, even when the whole charge for water supplied is included."

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V. THE WISDOM OF THE GOVERNMENT POLICY.

FOR Mr. Dutt and his associates, to say that the high rate of assessment produces results fatal to South Indian agriculture, and impoverishes the ryots, and makes them an easy prey to famines, is in no way borne out by a detailed study of the facts. It is time that the truth be spoken out plainly and forcibly. It is clearly proved that, had the principles he at present advocates been put into force at the beginning of last century, the ryots would have lost enormously.

Fortunately we have administrators at the head of the Government who have now got a firm grasp of the essential principles which should be in operation so as to produce a wise, judicious, and statesmanlike revenue administration. Many things still need improvement in this administration, but the conviction is borne in upon one that it is a merciful Providence that the order of the Governor-General, Marquiss Wellesley, which was given in 1799, compelling the Madras authorities to adopt and carry out Lord Cornwallis' Bengal scheme of permanent settlement in Madras, was not put in force to any appreciable extent throughout the Presidency. The Madras Government would have been terribly hampered during the past hundred years, and would have been condemned to look upon an impoverished exchequer, with the inevitable result that it would have been prevented from taking advantage of the benefits derived from the material improvement of the country, and from having the means within its power to develop irrigation and to introduce railways and other modern appliances of civilised mankind.

The Government of India has done a wise thing in embodying the principles adopted throughout India in land revenue administration in a Resolution, which has been published for information. Its methods of revenue administration are on the whole just and temperate, and its position is practically unassailable.

Glossary of Indian Terms and of Words with Special Meanings.

Avesta.—It is the sacred book of the Parsees. It signifies "the settled text" delivered by the sage Zoroaster. It along with the commentaries and paraphrases was written in Pahlavi—a late "Iranian dialect which followed on Zand and the old Persian of the inscriptions."

Ayakat.—Settlement; measurement of lands determining the boundaries of a village; the whole land belonging to a village. The ayakat of a tank is the area of "wet" land irrigated by that tank. The nanjah ayakat is the "wet" land belonging to a village.

Brinjal.—The egg plant—Solanum melongena.

Children of School Age.—The ratio usually taken to determine the number of children who are fit to attend school is 15 per cent. of the population. But this ratio is too low. In America in 1900-01 there were 21·4 per cent. of the population in the Primary Schools of the United States, while in Great Britain and Ireland there were 17·5 per cent. in the same year. About 20 per cent. is the correct ratio.

Cumbu.—The spiked millet,—Pennisetum typhoideum.

Cholum.—The great millet,—Sorghum valgare,

Crore.—Ten millions, or one hundred lakhs.

Chillies.— Red pepper,—Capsicum annum.

Collector.—This name conveys but a vague idea of the duties of the head of a district. The Collector is a member of the Civil Service, and a District Magistrate, and is held responsible for the maintenance of law and order in his division. He supervises the administration of criminal justice by the subordinate magistracy, and the work of the police. He has to look after the land revenue, the income-tax, and the excise and forest revenue. He has also to look after the land records, the state of the crops, and the general condition of the people. He is responsible for the upkeep of the irrigation tanks, and for the proper working of the forest department. He is President of the District Board, and has executive control of the Engineering establishment for the maintenance of the roads. He has to do with the spread of education, with the carrying on of dispensaries and hospitals, and with sanitation, vaccination, and the public health. He has to be on the outlook for epidemics, such as cholera and plague, and warn the Medical authorities and the Government on the approach of such. Besides he has to make frequent tours in his district throughout the year. Some Collectors exercise jurisdiction over very large districts. Of the 22 districts in the Madras Presidency 11 have over two million inhabitants each.

Ceded Districts.—These are Bellary, Cuddapah, Kurnool, and Anantapur, which were ceded in 1800 to the British.

Commutation Rate.—The rate at which the principal grain outturns are commuted into money. This is arrived at by taking the average price of the principal grains for the 20 non-famine years immediately preceding the settlement of the district in which it takes place. Some deduction is made for traders' profits, for the cost of cultivation, for the distance the grain has to be taken to market, and for a certain percentage on account of the vicissitudes of the seasons and of unprofitable areas of cultivation. The half of the remainder is the maximum taken as land assessment by Government.

Dravidian.—A man belonging to the Dravida country. Dravida is the early Sanskrit name for the Tamil country; in later times it is a "generic name for all South Indian peoples." The languages spoken are Tamil, Telugu, Canarese, Malayalam, and Tulu.

"Dry" Land.—Land which is cultivated by the rainfall, or from wells, but not from tanks. This kind of land is always on a higher level than the land irrigated from tanks.

Dusserah.—An important festival of the Hindus which lasts ten days. Then the farmer worships his plough, the artizan his tools, the tailor his needle, the clerks their pens, and the school boys their books. The goddesses, Saraṣvati and Doorga, are principally propitiated.

Garden Cultivation.—Cultivation of sugarcane, plantains, tobacco, chillies, and other valuable crops, chiefly from wells.

Fasli.—The harvest revenue year usually commencing in July.

Gathas.—This means songs, or verses; these songs are contained in the Buddhist work called Lalita-vistara in a dialect between the Sanskrit and the Prakrit. "The Zend hymns of the Zoroastrians are also called Gathas."

Intensive Cultivation.—Cultivation in which the land is highly manured and properly worked and irrigated in accordance with the best methods of agriculture.

Garce.—A measure of grain equal to 185·2 cubic feet, or 9,860 lbs. avoirdupois.

Jungle-Land.—Tract of land covered with wood or scrub, and not under cultivation.

Jaggery.—Raw sugar obtained by crushing sugarcane and boiling the juice expressed.

Kachcha well.—A well that is incomplete, and unbuilt with masonry ; a temporary well. Many of these wells are mere holes dug in the ground from which water is raised for a time for irrigation.

Lakh.—One hundred thousand.

Kullar.—A man belonging to the robber caste.

Literacy.—The word "literate" includes everybody who can read and write. This is the sense in which it was used in taking the Census in 1901 in South India.

Moghul.—The name given by Hindus to the Mahomedan dynasty founded by Baber and consolidated by Akbar.

Mhote.—The leather bucket, or vessel, used for raising water from wells for irrigation. It is drawn up by a rope by bullocks moving on an inclined plane.

Pallam.—A fortieth part of a viss—a viss being 3 lbs. 2 ozs.

Pagoda.—Hindu shrine or temple.

Picota.—Lever working on a raised pivot with a bamboo and bucket attached to the end for raising water from wells and channels. As a rule a man, or two men, walk on the lever so as to help to raise the bucket by means of their weight.

Periplus of the Erythraian sea.—This was written anonymously about 80 A. D. It is a manual for instructing navigators regarding the coast of Arabia and of India from the Indus to the Ganges.

Persian wheel.—A wheel keyed on to a shaft with ropes or chains to which a series of buckets are attached for raising water for irrigation purposes. It is driven by bullock power. This kind of lift is extensively used in Egypt and Persia, and in the Punjab, at the present day. It is a very ancient form of lift.

Pukka well.—A masonry well. It is a permanent well, and the opposite of a kachcha well.

Paddy field.—Rice field.

Panchama.—The new name given to the Pariahs and other low castes in South India. The word comes from the Sanskrit, and means the fifth class.

Ratinam.—A wheel on which a rope and bucket works for the purpose of raising water from a well.

Ragi.—Millet,—Eleusine coracana.

Ryotwari.—The system of settlement of land tenure in which there is no middle man or landlord over the individual ryots, or farmers, who are severally liable to Government for the revenue assessment on their holdings.

Saffron.—Turmeric,—Curcuma longa.

Seer.—It is equal to 3·0857 lbs. or about $3\frac{1}{8}$ lbs.

Silt.—Fine material which is washed into the bed of a tank.

Shrotiamdar.—A landlord or proprietor of an estate who receives rent from tenants and pays the land assessment direct to Government.

Subsoil water.—Water which descends into the soil by percolation, and lies there at a certain depth beneath the surface. It rises and falls during the year. Its surface is never level, but is sloped and curved at certain angles in accordance with the nature of the soil. It in places follows to some extent the surface of the ground, and is nearer the surface in low-lying parts. There are large lakes and seas of such water in many places in India.

Supplemental well.—A well which is sunk in the rice fields irrigated by a tank. This kind of well supplements the tank water when there is a deficiency of water in the tank. Without this well the crops in a year of scanty rainfall could not be brought to maturity. If a supplemental well be sunk for every three acres in the rice fields so as to tap the subsoil water supply lying underneath them the cultivation of all the rice fields in South India would be secured in a time of famine.

Shavi.—A term used when the crops have been dried up through want of rain, and when the remission of the land assessment has to be made.

Takavi.—Government loans to landholders and cultivators.

Turmeric.—Saffron.

Tirwakammi.—Remissions granted on irrigated lands.

cultivated with a "dry" crop, but which would otherwise have been left waste.

Toddy.—The fermented juice of the Palmyra palm.

Tank.—Name for an artificial lake, formed in a natural depression, with an embankment thrown across the lower part so as to retain water for irrigation purposes. The word comes from Portuguese, tanque, and the Latin, stagnum. Tanks are rain-fed as a rule; some have in addition a supply from river-channels. The water collected in them generally lasts for three or four months for irrigation, and is sufficient for one crop of rice, and in some cases for two crops, in the year.

Tope.—A plantation or area covered with trees.

Viss.—Equal to 3 lbs. 2 ozs. or 50 ounces.

Varagu.—Millet,—Pannicum miliaceum.

"Wet" land.—Irrigated land.

Zemindar.—A landlord or proprietor of an estate who lets out his land to tenants, and pays a fixed sum as land assessment direct to Government.

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APPENDIX 1.

Table showing the state of Primary Education in Municipal and Non-Municipal areas.

1902—03.	Municipal.	Non-Municipal.	Total.
No. of children of school age-boys	179,172	2,647,123	2,826,295
Do. do. girls.	184,549	2,720,710	2,905,259
Total of school age	363,721	5,367,833	5,731,554
No. of schools	2.917	23,417	26,334
Percentage of schools ...	11·1	88·9	
Pupils on the rolls boys ...	164,854	587,345	752,199
Do. girls ...	43,138	90,050	133,188
Total pupils	207.992	677,395	885,387
Percentage of children of school age at school boys ...	92·0	22·1	26·6
Do. girls ...	23·4	3·3	4·6
Percentage of boys and girls at school	57·1	12·6	15·4
Children of school age not at school	155,729	4.690,438	4,846.167

APPENDIX II.

Table showing the number of Public Primary Schools opened and closed, and the number of schools opened and closed in Villages and groups of hamlets.

District.	Public Primary Schools for boys in 1902-03.		Villages and groups of hamlets in 1902-03.	
	Number opened.	Number closed.	Number in which schools were opened.	Number in which schools were withdrawn.
Ganjam	1	118	11	20
Vizagapatam	...	47	...	11
Godavari	17	...	9	61
Kistna	53	16	40	...
Kurnool	...	2	7	...
Bellary	...	272	...	136
Anantapur	1	...	...	58
Cuddapah	55	26	69	...
Nellore	7	9	15	12
Madras	2	1	...	...
Chingleput	24	...	21	...
North Arcot	19	25	...	206
South Arcot	...	7	66	...
Tanjore	9	...	...	63
Trichinopoly	28	18	...	86
Madura	...	49	...	179
Tinnevelly	8	16	...	32
Coimbatore	...	28	4	5
Salem	2	10	14	11
Nilgiris	...	4	...	1
Malabar	4	51	...	...
South Canara	13	...	1	2
TOTAL	243	699	257	883

This shows that 456 Public Primary Schools were closed in 1902-03. But as 268 new Private Primary Schools were opened, the actual decrease was 188 Primary Schools.

As Primary Schools were withdrawn in 626 villages in all, and as 188 Primary Schools had been closed, 438 schools must have been begun in the larger villages.

APPENDIX III.

Comparison of the state of Education in different classes of the community in the Madras Presidency.

Class of the community.	Increase of pupils on the rolls between 1891-2 & 1902-3 for a period of 12 years.	Increase of children of school age on 15 per cent. ratio between 1891 & 1901, and also between 1901 & 1903 for 12 years—the last 2 years being calculated at the same rate of increase of population as in the previous ten.	Number of pupils on the rolls over (+) or under (—) the increase of children of school age.	
			For 12 years (1891-2 to 1902-3.)	For one year only (1902-3.)
Brahmins ...	17,839	13,157	+ 4,682	+ 2,875
Non-Brahmins, including Panchamas...	132,557	387,842	—255.285	— 18,467
Mahomedans ...	23,706	37,712	— 14,006	— 3,132
Native Christians...	16,617	29,376	— 12,759	+ 990
Eurasians and Europeans...	683	14	+ 669	+ 82
TOTAL ...	191,402	468,101	—276,699	— 17,652

This table is most instructive as it reveals the real state of affairs in regard to education of all grades. During the

12 years ending with 1902-03 the Brahmins and the Eurasians and Europeans were advancing in education, and gradually reducing the number of children of school age who were not being educated. In the 12 years the Brahmins reduced the number by 4,682, and the Eurasians and Europeans by 669, but the Brahmins have still about 64 thousand of the unfortunate children of their community, who are receiving no education whatever, to bring on to the school rolls. The Europeans and Eurasians have done the best of all, for they have 19·2 per cent. of the children at school. The Native Christians made headway last year and reduced their total of uneducated children by 990, but if the period of twelve years, ending with last year, be taken, they lost ground by more than 12 thousand, or at the rate of a thousand a year. They have still 80 thousand uneducated children to look after, and if last year's rate of progress be maintained it will take this community 80 years to overtake their neglected children.

The Mahomedans, last year, lost ground to the extent of over three thousand, and in the period of twelve years already mentioned to the extent of 14 thousand in all. They have still 260 thousand uneducated children. Turning to the Non-Brahmins and others, including the Panchama section of the population, we find a very serious state of matters. Last year they lost ground by more than 18 thousand, and during the twelve years they went back by 255 thousand, or at the rate of 22 thousand per annum. They have the vast host of about 4½ million children of school age still to educate.

APPENDIX IV.

Table giving a comparative statement of the state of Primary Education in the large Provinces of British India.

Province.	No. of Pupils in British India in 1901-02.	Percentage of pupils to children of school age in 1901-02.	Children of school age not at school in 1901-02.	No. of Children in 1901-02 over (+) or under (—) the number of children not at school in 1892-93.
Bengal, boys ...	1,559.789	27·8	4.046,706	
girls ...	107,465	1·9	5.497,773	
TOTAL ...	1,667,254	14·8	9,544,479	+ 377,487
Bombay, boys...	546,805	37·9	892,453	
girls ...	93,063	6·9	1.255,034	
TOTAL ..	639,868	22·9	2,147,487	— 41,299
Burma, boys ...	276,024	39·4	423,342	
girls ...	40,132	6·0	630,959	
TOTAL ...	316.156	23·0	1,054,301	+ 141,026
Central Provinces, boys.	131,208	18·0	597,189	
girls ...	11,350	1·5	741,749	
TOTAL ...	142,558	9·6	1,338,936	— 143,481
Punjab, boys ...	221,592	12·2	1,587,137	
girls ...	26,531	1·7	1,522.060	
TOTAL ...	248,123	7·4	3,109.197	+ 230,269
United Provinces, boys.	431,696	11·7	3,260.901	
girls ...	20,821	0·6	3.440,393	
TOTAL ...	452,517	6·3	6,701,294	— 45,053
Madras, boys ..	731,047	25·8	2,095,145	
girls ...	130,432	4·5	2 774 791	
TOTAL ...	881,479	15·0	4,869,936	+ 259.773

Total for the seven Provinces in decade + 778,722.—that is, this number indicates the increase of children not at school in the ten years.

APPENDIX V.

Statement showing the degree of literacy for each of the Districts in the Madras Presidency.

To get a precise idea of the education of the people it is necessary to look at the condition of each of the Districts. The degree of literacy varies in different parts of the country. The following table will illustrate my remark.

District.	No. in the thousand in 1901.	
	Literates.	Illiterates over 5 years.
Ganjam and Agency ..	38	826
Vizagapatam do .	25	846
Godavery do ..	44	813
Kistna	50	817
Nellore	48	833
Cuddapah	43	846
Kurnool	42	837
Bellary	46	824
Anantapur	42	836
Madras	227	657
Chingleput	78	777
North Arcot	61	799
Salem	38	818
Coimbatore . ..	51	807
Nilgiris	116	759
South Arcot	71	785
Tanjore	101	760
Trichinopoly	66	793
Madura	72	790
Tinnevelly	100	760
Malabar	101	765
South Canara	58	809

The average number of literates for all classes is 63, and of illiterates above five years of age 802 in the thousand. It will thus be seen at a glance that the Northern and Ceded Districts are greatly below the average in literacy; while all the Southern Districts, excepting N. Arcot, Salem, Coimbatore, and S. Canara, are above the average. Madras City heads the list in literacy; then follow the Nilgiris, Tanjore, Malabar, and Tinnevelly. Madras City has, however, 334 thousand illiterates over five years of age. Tinnevelly has over $1\frac{3}{4}$ millions; Madura over $2\frac{1}{4}$ millions; Vizagapatam nearly $2\frac{1}{2}$ millions, and Tanjore about $1\frac{3}{4}$ millions.

These figures give us the true perspective and show what an enormous lee-way has yet to be made in each of the Districts of the Presidency.

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